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REINFORCED CONCRETE PAVEMENT ON ARCH BRIDGE, GLEN RIDGE, N. J.

REINFORCED CONCRETE PAVEMENT IN GLEN RIDGE

Method of Construction and Cost of Pavement Laid by Town and Railroad on an Arch Bridge in Connection with Railroad Crossing Elimination—Middle, Side and Transverse Expansion Joints.

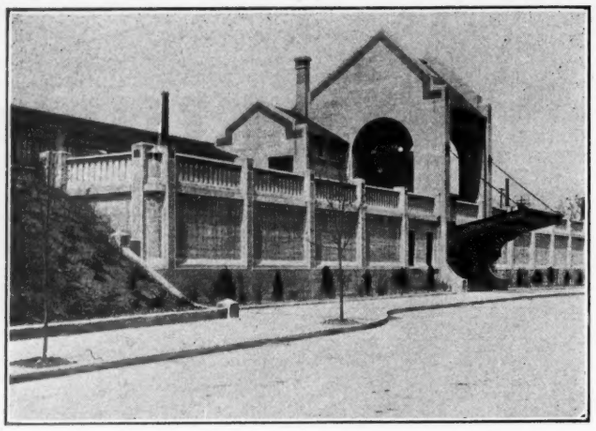
By C. E. McDOWELL.

During the past two years the D., L. & W. Railroad has been reconstructing its line to Montclair, N. J. The main idea was to eliminate all grade crossings in Montclair, Glen Ridge, Bloomfield and Watsessing, but advantage was taken of the changes made in grade and line to reconstruct the stations, which are now perhaps the finest in any of New York's suburbs. About $1,500,000 was spent on the improvements, part of which was paid by the municipalities, the county and the street railway whose lines crossed the railroad.

Concrete was used very extensively in all parts of this work—bridges, retaining walls, stations, etc.; and the last part of the work to be completed was the roadway of a bridge crossing the tracks at Glen Ridge, which was of reinforced concrete. The station at Bloomfield is of concrete throughout, and cost $65,000. The street at the station, paralleling the railroad embankment, was paved with asphaltic concrete, Topeka specification, on a 6-inch concrete base. The sidewalk was of cement, 20,000 square feet, and there was 1,500 feet of concrete curb and 1,800 feet of heavy retaining wall. The concrete for the pavement base was mixed 1:3:6; that for the curb and walk was the same, with a 1:2 surface finish.

At Glen Ridge an existing stone arch bridge across the tracks was rebuilt because of the widening and change in grade of the roadbed, and the new pavement on this bridge was made of concrete 6 inches thick and reinforced. The mixture used was one part Portland cement, 1½ parts washed sand and 3 parts washed gravel not exceeding 1½ inches in diameter. The concrete was made very wet and was mixed with a Koehring batch mixer. The reinforcement used was No. 7 triangular mesh made by the American Steel & Wire Company. This was placed about 2 inches below the surface of the concrete, adjacent sheets of the reinforcement overlapping about 3 inches. The concrete was not tamped. It was finished with a wooden float.

A longitudinal expansion joint was made in the middle of the 48-foot roadway, and additional joints along each curb and transversely at 25-foot intervals; all of these being one-half of an inch wide and were filled with asphalt. The pavement contains about 1,500 square



RAILROAD STATION AT BLOOMFIELD, N. J.

yards. It is guaranteed for three years. As the main street of the town crosses this bridge, the test of this pavement will be quite severe, and it will be closely watched to determine how it stands up under such traffic. The work was done with extreme care and during construction was inspected by several concrete experts.

The gang employed on the work consisted of a foreman and 12 men, and a timekeeper and material man. The rate of construction was about 200 square yards a day. The cost per square yard was calculated to have been as follows:

Grading	$0.15
Rolling sub-base	.025
Foreman, at $5	.025
Labor, at $2	.12
Cement	.30
Sand	.13
Gravel	.37
Reinforcement	.05
Asphalt	.05
Forms and floating	.05
Timekeeper and material man	.015
Use of mixer	.05
Sundries	.015
Total, per sq. yd	$1.35

This roadway and practically all of the concrete work at Bloomfield were done by the Newton Paving Company, of Trenton, N. J., with the writer in charge of construction.

PAVING BETWEEN TRACKS.

In a recent discussion on the subject of paving by the American Society of Civil Engineers, the paving of the street railway area was referred to as follows by William Goldsmith, of the Manhattan Bureau of Highways:

"According to the New York railroad laws and charter requirements, the pavement between the railroad tracks and for 2 feet on each side of them is maintained by the railroad company, but must be constructed in accordance with specifications prepared by the city engineer.

"Investigations in New York City have shown more depressions and other defects on pavements between the tracks and near them than at other places. The question, therefore, naturally arises which is the best pavement to place in the railroad area, asphalt, wood block or granite?

"The consensus of opinion in Manhattan borough seems to be that the improved granite block is the most satisfactory. It has some disadvantages, however, on account of the ties which come in between the slot rail and track, which make it necessary to chip the granite blocks to make them fit well between these cross-ties.

"The joints in Manhattan borough are made with paving pitch and sand. The speaker is informed that the street railroad companies in Brooklyn have used cement grout almost entirely during the past eight or ten years, and very successfully."

Commenting upon this, H. W. Durham, chief engineer of highways of Manhattan, said:

"Reference has been made to stone block pavements in the car tracks, and to the different methods of filling joints. The speaker thinks that one important point in New York City practice was not brought out as clearly as possible. It explains very largely the difference between the practice in the boroughs of Brooklyn and the Bronx and that adopted for Manhattan, and is mostly due to the radical difference in the types of track construction. In Manhattan an underground current conductor with central slot between the rails is used almost entirely. In all the other boroughs current is taken from an overhead wire, necessitating no special work in the track. The Manhattan construction requires the possibility of very frequent access to the substructure, for repairs either to the current conductor system or the cast iron yokes carrying the track. Therefore it has been found more desirable to use a type of pavement which can be easily removed and promptly restored after repairs are made.

"The use of a cement grout as a filler gives an excellent surface between the rails, as may be seen on some of the Brooklyn and Bronx streets; but, if this were used in the Manhattan track construction, it would render very difficult the making of any openings for repairs to the numerous hand and manhole boxes and other sub-surface structures, and it would also be difficult to obtain proper setting of the grout filler after repairs were made. This largely explains the difference in practice."

GRANITE BLOCK PAVEMENT

Maximum of Hardness Not Desirable—Softer Granites Give Smoother Pavements—Location of the Eastern Granite Block Quarries.

The highway officials of New York City consider that for streets with any considerable amount of city traffic the most satisfactory pavements are granite block, wood block and sheet asphalt. A considerable part of the latest report of the Bureau of Highways is given to the discussion of stone block, and from this we abstract the following:

Granite block, even under the best conditions, is noisier under steel tires and horse-drawn vehicles than others. It is not so easy to clean. With tar-filled joints a cut can be restored practically as good as the original pavement. Its slightly roughened surface gives a good foothold for horses' hoofs, and its durability is superior to all other types.

The popular idea of granite pavement in this country is based on the old block pavements laid with wide joints, where the head speedily became rounded, producing a cobblestone effect. As laid under the present specifications, with flat heads and close joints, it presents a nearly smooth surface and one which cannot wear rounded and uneven. Very hard granite is liable to wear as smooth and slippery as any other type.

It is now universally admitted that granite block for pavement should be accurately cut to standard dimensions and laid with close joints. There are, however, two distinct points of view in regard to the physical composition of the blocks used. That taken by Mayor Gaynor's committee on pavements is to the effect that

all deterioration in stone pavement is due to wear consequent on lack of sufficient crushing strength and hardness, and that only the hardest granites can stand the wear of traffic under present conditions.

The other point of view is exemplified in the following statement of Mr. McClure, city engineer of Worcester, Mass., which is of interest, as that city has made extensive use of granite for paving purposes and its streets are admittedly in excellent condition:

"I attribute much of our success in the use of granite blocks to the fact that we have always used the New Hampshire granite, the greater part of the blocks coming from the Marlboro quarries, which is soft enough to wear without polish and hence with a slight degree of slipperiness."

A similar point is also made in the following statement quoted from a paper written recently by Col. R. W. Crompton, M. Inst. C. E., Great Britain, and published by the Institution of Automobile Engineers:

"Many people, including a considerable proportion of the road surveyors, have, up to quite recently, looked on the question of the wear of road surfaces rather superficially; that is to say, they have always considered that surface wear was the most important matter, and have selected for their macadamized roads the stones from those rocks which offer the greatest resistance to attrition. In this, however, they are wrong."

Rounded blocks are not an evidence of lack of hardness, but rather the contrary. Many of the older pavements where the blocks are in the poorest condition, with rounded tops and extremely polished surfaces, are known to have been laid with hard material, the constant friction of horses' hoofs and steel tires on the edges of the blocks, combined with the wide sand joints, producing the above result. Under similar conditions a soft block would wear on the top as well as on the edges, as can be observed in the Medina sandstone pavements of Rochester and Buffalo.

The Fourth avenue pavement was practically the first laid under the improved specifications. With the exception of certain portions where faulty work was done or where operations of the Department of Water Supply, Gas and Electricity and the gas company have injured it, and excepting, also, the railroad area included between limits two feet outside of the tracks where the pavement has not yet been relaid and where, due to the poor condition of the rails, it has settled in many places, the surface is good, and the blocks show little evidence of wearing round after two seasons of service. Work is shortly to be started in the railroad area, which is to be entirely repaved with new blocks after the rails have been changed. (This work has since been done.—Ed.)

The following table contains the names and locations of the principal granite quarries available at present for New York paving blocks and indicates approximately the present capacity of each:

Quarry.	Capacity in blocks per year.
Harris Granite Quarries Co., Salisbury, N. C.	3,000,000
Rockport Granite Co., Rockport, Mass.	6,000,000
Westerly, R. I.—Booth Bros.	500,000
Alexandria Bay, N. Y.—J. Leopold	500,000
Long Cove, Me.—Booth Bros.	2,500,000
Roberts' Harbor, Vinal Haven, Me.—Booth Bros.	1,000,000
East Boston, Vinal Haven, Me.—J. Leopold	1,500,000
New England Granite Co.—N. H., Mass. and Vt.	6,000,000
Mt. Waldo & Mosquito Mountain, Me.—John Pierce	2,500,000
Mt. Airy, N. C.	500,000

The quarries are arranged approximately according to the hardness of their output. Salisbury, Rockport, Westerly and Alexandria Bay are extremely hard. The Rockport stone has a coarse grain, rendering it very difficult to obtain a finely dressed block.

The borough of Manhattan alone is at present requiring annually between 200,000 and 300,000 square yards of granite block, or from six to nine million blocks.

PAVING STATISTICS OF AMERICAN CITIES

Data received since publishing the tables in our March 5 issue.

TABLE NO. 2.—SIDEWALKS, CURBS AND GUTTERS LAID DURING 1913.

City.	Sidewalks.			Curbs.			Gutters.			
	Material.	Sq. yds.	Cost.	Material.	Lin. ft.	Cost.	Material	Sq. yds.	Lin. ft.	Cost.
California:										
Pasadena	Concrete	16,760	....	Concrete	31,330	....	Concrete	10,587	45,260	....
Riverside	Concrete	20,000	1.26	Concrete	16,704a	0.60	.....	.....	.....	.....
San Francisco	Artificial stone	10,396	1.59	Granite	122,480	1.34	Basalt blocks	4,368	.....	3.66
	Broken rock	22,143	0.45	Concrete	7,566	0.68	Artificial stone	396	.....	1.374
				Redwood	22,272	0.465	.....	.....	.....	....
Colorado:										
Monte Vista	Concrete	555	1.44	.....	.....	....	.....	.....	.....	....
Idaho:										
Boise	.....	.....	....	.....	.....	....	Concrete	7,330	.....	1.12
Iowa:										
Waterloo	Concrete	35,000	0.48	Concrete	42,286a	0.60	.....	.....	.....	....
Massachusetts:										
Newburyport	Concrete	1,500	1.11	Concrete	600	0.38	.....	.....	.....	....
				Flagstone	900	0.48	.....	.....	.....	....
Missouri:										
Independence	Concrete	3,470	1.08	Concrete	156,985	.327	Concrete	.....	27,272	.446
Kansas City	Concrete	114,533	1.02	Concrete	13,183a	.80	.....	.....	.....	.....
Liberty	.....	.....	....	Concrete	6,500	0.40	.....	.....	2,100	.85
New York:										
Port Jervis	Concrete	1,000	1.20	.....	.....	....	.....	.....	.....	....
Ohio:										
Hamilton	Concrete	3,750	1.08	Concrete	5,520a	.50	.....	.....	.....	.....
Troy	Concrete	3,500	.72	Concrete	6,000	.22	Concrete	.....	6,000	.11
Tennessee:										
Fayetteville	Concrete	5,500	....	Concrete	7,800a	....	.....	.....	.....	....
McKenzie	Concrete	5,500	....	.....	.....	....	.....	.....	.....	....
Union City	Concrete	15,000	....	Concrete	5,000a	....	.....	.....	.....	....
Virginia:										
Hampton	Concrete	500	1.25	Concrete	2,000a	.65	.....	.....	.....	.....
Norfolk	Concrete	3,798	.81	Granite	29,391	.50	Granite Block	3,315	.....	1,80
	Brick	9,170	.96	Concrete	48,600a	.46	.....	.....	.....	....
Washington:										
Aberdeen	Concrete	6,031	.85	.....	.....	....	.....	.....	.....	....
	Plank	3,350	....	.....	.....	....	.....	.....	.....	....
Spokane	Concrete	53,417	....	.....	.....	....	.....	.....	.....	....
Wisconsin:										
Two Rivers	.....	....	....	Concrete	18,000a	....	.....	.....	.....	....
Canada:										
Edmonton, Alta.	Concrete	44,837	1.60	Concrete	124,759a	.85	.....	.....	.....	....

a—Combined curb and gutter.

TABLE NO. 1.—NEW PAVING DONE DURING 1913.

City.	Sheet asphalt.	Asphalt block.	Granite, sandstone or other stone block.	Brick or clay block.	Creosoted wood block.	Concrete.	Bitulithic.	Bituminous. Concrete.	Bituminous. Macadam.	Plain or waterbound macadam.	Gravel.	Other kinds.	Repairing done by city with its own force.	Kind of repair plant used by city.
California:														
Pasadena	26,889	.....	.....	1,648	.....	.....	68,158	.....	81,414	.....	.....	2,139	.....	.....
Riverside	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	60,000	.....	All	Crusher, asph pl't, concrete mixer, steam roller, etc.
San Francisco	140,713	.....	181,661	4,000	.....	.....	.....	.....	1,522	51,801	.....	130,976a	Practicaly all	
Idaho:														
Boise	26,543	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7,098	.....	.....
Illinois:														
Evanston	.....	.....	.....	1,177C	.....	9,760C	.....	.....	.....	.....	.....	.....	Brick & macadam	None
Iowa:														
Waterloo	105,261	.....	.....	7,500	800	900	.....	.....	.....	.....	.....	.....	None	.....
Massachusetts:														
Newburyport	.....	.....	.....	.....	.....	1,500M	.....	.....	2,700M	5,333M	10,000M	.....	.....	.....
Missouri:														
Independence	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,074	.....	.....	.....	.....
Kansas City	.....	.....	2,416C	61,517C	2,191C	252,389C	.....	91,427C	75,382C	4,563C	.....	.....	All kinds	1,500-yd. station-ary asph. plant
Liberty	.....	.....	.....	.....	.....	12,000C	.....	.....	2,400C	.....	.....	.....	.....	.....
New Jersey:														
Jersey City	6,328	.....	49,502	27,329	9,518	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ohio:														
Elyria	8,953	14,815	.....	27,890	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hamilton	27,447C	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Troy	.....	.....	.....	.....	.....	.....	.....	.....	25,000C	.....	.....	.....	.....	.....
Tennessee:														
Fayetteville	.....	.....	.....	.....	.....	.....	.....	.....	.....	14,000	.....	.....	.....	.....
McKenzie	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9,000b	.....	.....
Union City	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25,000b	.....	.....
Virginia:														
Hampton	.....	.....	.....	8,000C	.....	.....	.....	.....	.....	.....	.....	10,000M.c	.....	.....
Norfolk	92,565C	.....	42,972MCd	.....	3,842C	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington:														
Aberdeen	22,883C	.....	.....	.....	.....	22,024C	.....	3,473C	.....	.....	.....	1.36Ce	.....	.....
Spokane	4,170	.....	.....	6,019	3,531	1,054	.....	117,300	.....	.....	.....	.....	.....	.....
Wisconsin:														
Two Rivers	.....	.....	.....	.....	.....	.....	.....	.....	7,000C	18,000C	.....	.....	.....	.....
Canada:														
Edmonton, Alta	82,578	.....	.....	.....	6,736	.....	111,834	115,739	.....	.....	.....	.....	.....	.....

a—126,154 sq. yds. of bituminous rock, 4,822 sq. yds. of cobblestone. b—Chert roadway. C—Shell. d—24,312 cu. yds. by contract of granite block with wood keys. e—plank.

TABLE NO. 3.—RESURFACING DONE DURING 1913.

City.	Sheet asphalt.	Asphalt block.	Granite, sandstone or other stone block.	Brick or clay block.	Creosoted wood block.	Concrete.	Bitulithic.	Bituminous. Concrete.	Bituminous. Macadam.	Plain or waterbound macadam.	Gravel.	Other kinds.
California:												
San Francisco	.....	.....	1,063	.....	.....	.....	.....	.....	.....	.....	.....	.....
Illinois:												
Evanston	.....	.....	.....	.....	.....	.....	.....	9,564Ca	.....	.....	.....	.....
Missouri:												
Kansas City	.....	.....	9,798b	.....	.....	.....	.....	39,502a	.....	.....	.....	13,995c
New Jersey:												
Jersey City	.....	.....	9,502d	.....	9,518d	.....	.....	.....	.....	.....	.....	.....
Virginia:												
Norfolk	.....	.....	33,568e	.....	.....	.....	.....	.....	.....	.....	.....	.....

a—Replaced sheet asphalt. b—Replaced old stone block. c—Two inches on old brick pavement as base. d—Replaced Belgian block. e—Replaced same kind of pavement.

TABLE NO. 4.—WORK CONTEMPLATED FOR 1914.

City.	Sheet asphalt.	Asphalt block.	Granite, sandstone or other stone block.	Brick or clay block.	Creosoted wood block.	Concrete.	Bitulithic.	Bituminous. Concrete.	Bituminous. Macadam.	Plain or waterbound macadam.	Gravel.	Other kinds.
California:												
Pasadena	6,400			510			20,618		164,974			11,585
South Pasadena	25,000	8,000					52,000	20,000				
Illinois:												
Evanston				139,650		33,600		10,850	4,150			
Indiana:												
Aurora				32,000								
Iowa:												
Waterloo	32,000			4,100		2,000						
Missouri:												
Kansas City				50,000	65,000	240,000		150,000	65,000			
Liberty						10,000						
New Jersey:												
East Orange							10,000					
Jersey City			25,000	6,000	6,000							
New York:												
Ossining		4,407		8,814								
Port Jervis				5,000								
Ohio:												
Elyria												30,300
Hamilton	80,000											
Troy						5,200		2,000				
Washington:												
Aberdeen	30,000					24,000		3,000				1.0
Wisconsin:												
Two Rivers									8,000	13,000	9,000	

PAVING IN TRENTON, N. J.

Preliminary Work—Sheet Asphalt, Asphaltic Concrete, Vitrified Brick, Granite Block and Concrete—Specifications, Prices and Construction Details.

By HARRY F. HARRIS, Assoc. M. Am. Soc. C. E.*

During the past season the city of Trenton completed the construction by contract of approximately 94,000 square yards of pavements, 65,000 yards of which was new work. The great bulk of this was not confined to any one paving material, but was distributed among four or five different kinds. A brief review of some of the details concerning specifications, inspection, and the methods employed in the preliminary work, might be of general interest. These ideas have been in use during the last two seasons, or since the advent of Commission Government

Shortly after the first of each January the engineer compiles a list of all petitions on file in his office, requesting the paving of certain streets. Estimates are made, based on the approximate area of the several streets, of the probable cost of the contemplated work. The director of the Department of Streets then arranges a conference with the director of the Department of Finance and Revenue, to determine just how much of the estimated amount can be expended during the season for street improvement. This determined, notices of intention to pave are then published, giving ample opportunity to property owners along the line of each street to object to the proposed improvement should they so desire. Unless objected to by the owners of more than a majority of the linear feet of lots fronting on the streets, the ordinance is then passed and bids are advertised for. (In some cases where a street is used as a thoroughfare, or local conditions are such that it is imperative that a given street be improved, the ordinance is often passed by a four-fifths vote of the commission, notwithstanding the fact that the owners of lots representing more than a majority of the linear feet of property fronting on the street have objected to the improvement.) The commission, upon the recommendation of the engineer, also specifies the kind of material to be used in paving each street, giving due weight, however, to the preferences of the owners.

Specifications are so drawn that they cover all the various kinds of materials to be advertised for in one booklet. The entire season's work, as nearly as is practicable, is advertised for in one notice, although a separate bidding blank is used for each individual street, in order that any variations in haul, excavation, etc., may be taken into consideration by the bidders, and the assessments made on a more equitable basis. It very often happens, however, that all the asphalt work is awarded to one firm, and all the brick to another, and so on.

The specifications in use follow very closely those adopted by the American Society of Municipal Improvements, being changed only in minor details to meet the local conditions. Heretofore considerable criticism (much of which was unjust) was made in regard to the specifications in use prior to the adoption of the more modern specifications. This criticism has largely been eliminated, as both the public and the contractor feel that these are standard and all are bidding upon an equal footing.

Sheet Asphalt. Some 28,700 yards of sheet asphalt were laid, 20,600 yards of which was new work. Two brands of California asphalt and the Bermudez lake as-

*Assistant Engineer of Streets, Trenton, N. J.

phalt were used in connection with this class of work. Prices ranged from $1.75 to $1.81. The work for $1.75 per square yard included 4 inches of 1:3:6 concrete base, 1 inch of binder, 2 inches of wearing surface, five year guarantee and all excavation. The excavation was approximately 10 inches in depth. The price of $1.81 was for a California asphalt, known as "Maltha Brand," a product of the Union Oil Company. This price included a 1:3:6 concrete base, six inches in depth, in which slag was used as a coarse aggregate; also a wearing surface as above, and all excavation and a five-year guarantee.

The following is an average of ten analyses of the sheet asphalt top mixture which might be assumed as typical:

Asphalt cement	10.72%	Pass 40 mesh	8.95%
Pass 200 mesh	9.25%	Pass 30 mesh	7.18%
Pass 100 mesh	15.41%	Pass 20 mesh	11.36%
Pass 80 mesh	6.01%	Pass 10 mesh	8.46%
Pass 50 mesh	22.89%		

Asphaltic Concrete. Prices on this work ranged from $1.62 to $1.71 per square yard. The work let at the price of $1.62 was for another California asphalt known to the trade as "Star Asphalt." This figure includes the excavation, 4 inches of concrete base, two inches of wearing surface, and a guarantee of one year, while the price of $1.71 per square yard was for Bermudez asphalt two inches thick, laid on a five-inch concrete base, with excavation and a five-year guarantee included. Approximately 26,500 square yards of asphaltic concrete pavement was constructed.

All of the asphaltic concrete was of the type known as the "Topeka specification." Daily tests, by the city chemist and assistant, were made both in the laboratory and at the plant.

On all streets where a bituminous concrete wearing surface is to be placed, the concrete foundation is grooved and corrugated by means of a tamper having triangular shaped projections on its working surface, for the purpose of preventing any movement in the top coat after laying. The hot asphalt is forced into these depressions and is there anchored, thus doing away with the necessity of providing a binder course.

Vitrified Brick. This pavement was laid to the extent of 24,000 square yards. Every car load of brick received was tested in the "new standard" rattler, owned and operated by the city. It was required that the bricks should not lose more than 22 per cent in some cases, and in a number of the others the maximum loss allowable was 20 per cent. Considerable objection was made to this latter requirement on the grounds that competition was so limited as to admit possibly only one make of brick. This, however, was not true; but the probability is that the maximum loss of 22 per cent will be adopted in the future for the heaviest traffic streets, where brick are to be used. It has been thought that, by requiring a brick which will not lose more than 20 per cent of its weight in the abrasion test, it is somewhat problematical as to whether or not the quality is increased at all. A brick which may meet this requirement is very apt to be burned or baked so hard that it is perceptibly brittle.

The following is a summary of the results obtained in testing five different makes of brick on the new rattler conducted in conformity with the recommendations adopted by the Am. Soc. of Municipal Improvements:

Brand "A" wire cut lug (shale), average of 27 tests, 20.3 per cent loss.

Brand "B" wire cut lug (shale), average of 58 tests, 19.05 per cent loss.

Brand "C" repressed block (fire clay), average of 17 tests, 20.5 per cent loss.

Brand "C-I" wire cut block (fire clay), average of 7 tests, 21.8 per cent loss.

Brand "D" repressed block (shale), average of 23 tests, 20.5 per cent loss.

Brand "E" repressed block (shale), average of 19 tests, 18.03 per cent loss.

The use of the rattler has tended in a remarkable degree to prevent the shipments of inferior grades of block to this city. Manufacturers do not relish the idea of having a carload of brick rejected, as the freight charges in themselves are considerable in addition to the value of the consignment.

The expansion joints for vitrified brick pavements are made by tamping the regular sheet asphalt top mixture into the joint spaces, which are used both transversely and along each gutter line. The transverse joints are spaced about 75 feet apart and are about ⅝ inch wide. The tamper is one made by local blacksmiths, having a width or length of about 3½ inches and a thickness of about ⅝ inch. While this method of filling the joints may be considered somewhat of a novelty, still the results have been very satisfactory, and it has the advantage of being able to fill the joint prior to grouting the pavement. Under the method recommended in the standard specifications (that is, of grouting first and then filling the expansion joint with a coal tar filler or other similar material), considerable difficulty was experienced in removing the wooden strips which were temporarily inserted in the joints, on account of their swelling, due to the absorption of moisture from the grout, and in addition to this, it was discovered in several instances that the grout had flowed into the space left for an expansion joint, to the depth of an inch or more, with the result that a failure took place at these points. Instead of being an expansion joint, we merely had a weakened cement joint.

Granite Block. Granite block was specified for the area occupied by the traction companies. The granite used was that obtained from quarries located in Massachusetts near the New Hampshire state line, and some also from the state of New Hampshire. Granite from this locality is comparatively soft and has a fine, close grain. This particular type of block wears down quite uniformly under traffic. These pavements were all laid in much the same manner as in the more progressive cities of New England, and as laid in the city of Newark and vicinity. The method referred to is that of using a shallow block, either four or five inches in depth, laid on a concrete foundation and then thoroughly grouting the joints with Portland cement mortar and finally flushing the top to the depth of about ⅜ of an inch. About 4,200 square yards of this type of pavement was constructed. The price per square yard was $3.49. As this was for paving between the tracks, it was naturally somewhat higher than would have been the case had the street to be paved been one without car tracks.

Concrete. Although concrete pavements have not as yet proved a decided success locally, they are used to some extent for paving the alleys. In all 4,261 square yards of such pavements were constructed. The total thickness was 6 inches and laid in one course. Washed river gravel was used as the coarse aggregate, the proportion used being 1:2:4. Provision for contraction was made by using a joint extending entirely through the pavement every 25 feet, at right angles with the center line of the roadway. These joints were filled by inserting during construction one layer of 3-ply tarred paper. The idea was entirely experimental. It was thought that by using such narrow joints at comparatively close intervals, the liability of raveling and wearing at the joints could possibly be avoided, or at least

reduced to a minimum. The results, however, have not been as satisfactory as was anticipated. Prices for this work varied between $1.07 and $1.11 per square yard, which price included the excavation.

Gutters. Concrete gutters ranging in width between 18 and 24 inches are constructed in all streets paved with asphalt or asphaltic concrete. Besides facilitating the flow of water and at the same time preventing the disintegration of the asphalt along the gutters, it reduces the cost of the pavement quite perceptibly. The price paid ranged from $1.25 to $1.35 per square yard, as against $1.62 to $1.81 for the asphaltic materials. The grades as a rule are extremely light, averaging 0.4 per cent in a great many sections of the city, and in a number of instances it has been necessary to resort to a 0.3 per cent grade. It is quite possible to trowel or finish a concrete gutter very true, providing, of course, that grades are set at intervals of about 20 or 25 feet, while it would not be practicable to roll an asphalt gutter nearly as uniform as a concrete gutter.

NOVEL USE OF CONCRETE MIXER BOOM.

An interesting instance of the application of ingenuity by a contractor in meeting an unusual condition has been described at our request by a member of the firm of Kelley Brothers, of Portsmouth, O., his description being as follows:

We had a contract at Welch, W. Va., for 24,000 lineal feet of curb and gutter, together with 20,000 square yards of brick pavement on a 4-inch concrete base. The streets of Welch are so situated and so narrow that the regularly used method of piling material for concrete ahead and mixing the concrete in the streets, spreading the concrete with the boom and bucket, could not be worked to good advantage, and we decided to place our No. 14 Koehring boom and bucket mixer near the railroad siding, where the stone and sand (both of which had to be shipped in on cars) were left. Teams were used to haul the concrete to the work, the wagons being loaded by the boom and bucket of the mixer, as shown in the photograph.

We used 16 men at the mixer, and 3 men on the streets to receive the concrete, which was hauled by an average of about five teams with 1½-yard Troy dump wagons hauling about one cubic yard of wet concrete to the load. It was a hard matter to keep the teams from getting blocked at times, but for this particular job it proved a very good way to handle the concrete. The same force of men and teams also kept a gang of men in concrete building curb and gutter at the rate of about 400 feet per day.

We placed in the street an average of about 1,200 square yards of the 4-inch concrete per day of 10 hours, and enough concrete was mixed for 400 lineal feet of curb and gutter, 6x12x18, at a cost of approximately $65 per day, which includes the hauling of the concrete. The average haul of the concrete on this job was about 1,500 feet, the longest haul about 3,000 feet.

With the right kind of a location, either near a gravel bank or along a railroad switch where the concrete material is being unloaded from the cars and where the cement is handy, I believe that concrete can be very successfully and economically handled by the above method, using a Koehring mixer and boom and bucket.

INSPECTION OF STREET PAVEMENTS

Patrol Inspection Districts to Keep Track of Condition of Pavements—Permits and Follow-Up Reports for Street Openings.

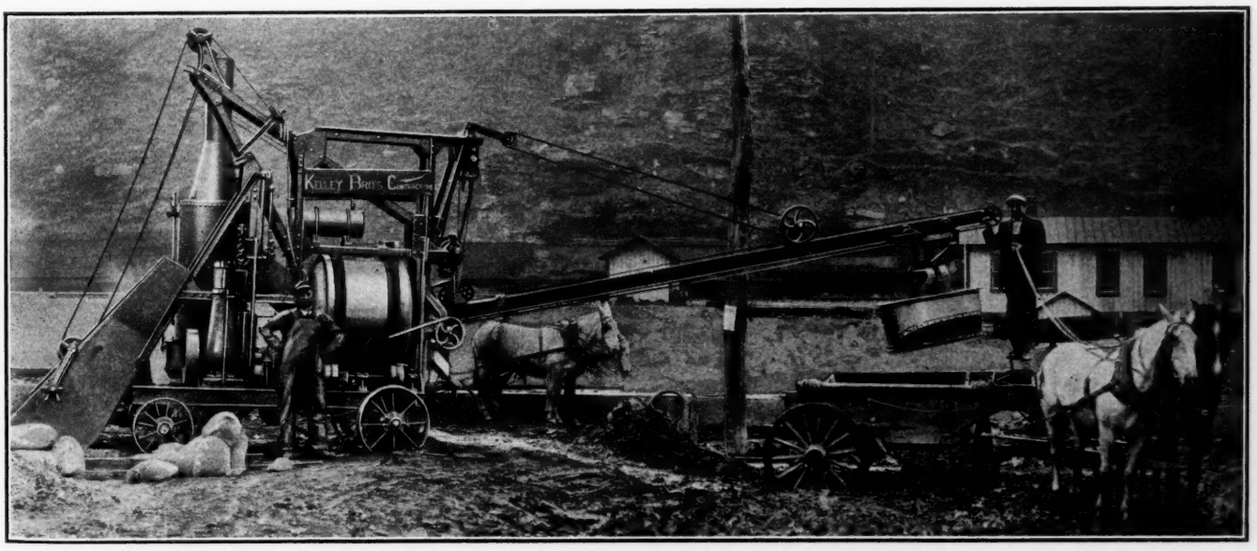
In a discussion on road maintenance before the American Society of Civil Engineers, William Goldsmith, who has charge of the issuing of permits for street openings in Manhattan borough, New York, described as follows the system of street inspection in operation in that borough:

In past years civic organizations and private citizens have complained repeatedly about the poor condition of the pavements in Manhattan borough, and particularly with reference to the length of time elapsing between the opening of a pavement and its final restoration. These complaints culminated in an investigation by the Commissioners of Accounts during 1906 and 1907. Their report showed:

First.—That there was no system which made it possible to follow up cuts made in pavements so that they could be quickly restored.

Second.—That the responsibility was not fixed, and the shifting of blame from one to another was not only possible, but was the case whenever difficulties arose.

In 1910, under Borough President McAneny, steps were



USING BOOM AND BUCKET OF CONCRETE MIXER TO FILL WAGONS.

immediately taken to remedy these conditions. The Bureau of Municipal Research, working in conjunction with the Bureau of Highways, inaugurated an inspection system, which, during the last two years, has worked admirably. Although this is a detail in highway organization, it is vital to success, and is worth while noting.

The city is divided into districts, for each of which there is a patrol inspector. His territory covers about 10 miles of pavement, there being about 450 miles of paved streets in Manhattan. It is the inspector's duty to report at least once a week regarding the general condition of the pavements, and to report promptly on all street openings, building operations and encroachments for which permits are issued.

In order to give a clear idea of the inspection system referred to, take, for example, a plumber's street opening. The plumber must be licensed (pass an examination as to fitness, before the Board of Plumbing Examiners), and must execute a $1,000 bond with the city for the proper performance of his work. He comes to the permit division, which is under the direction of the Bureau of Highways. A technical man, called the supervisor of permits, is in charge of this division and keeps in direct touch with contemplated pavement work, sewers, or other constructions; sees that sub-surface corporations do their work in streets previous to resurfacing; that all departments are notified of contemplated constructions; and approves every permit before it is issued. The plumber makes a cash deposit covering the probable cost of pavement restoration. This payment includes an inspection and overhead charge (which amounts to approximately 50 cents per square yard). He must also make a cash deposit of an equal amount, which is retained for six months, to insure the city against any settlement of the pavement due to improper backfill or other poor workmanship.

As soon as a permit is issued, triplicate inspection forms are made out on a typewriter in the permit division. These forms provide space to give the inspector in the field all the information necessary for a proper inspection of the work. These forms are called: (1) "Preliminary"; (2) "Tickler," and (3) "Final."

The "preliminary" report is given to the inspector, whose duty it is to see that the conditions of the permit are complied with, to report thereon what work was done, and, by actual dimensions and sketch, show just how much pavement was disturbed, and the quantity to be restored and its exact location.

The "tickler" and "final" forms are filed in a cabinet provided for that purpose in the main office. When the "preliminary" report is received from the inspector, the "final" is sent to the pavement contractor, who honors it as an order from the city to restore the pavement. The contractor hands this "final" to his foreman, who takes it out on the work and makes the necessary repairs in amount and location as shown.

With these repair gangs there is another set of inspectors, called maintenance men, who are entirely independent of the patrol inspectors. The foreman of the repair gang hands this "final" report form to the maintenance inspector assigned to his work, and it is this inspector's duty to see that the pavement, of the exact amount and location shown on the inspection form, is repaired according to specifications. He then records the actual amount repaired and signs this "final" form in a space provided for that purpose. These maintenance inspectors are notified by a chief inspector about eighteen hours in advance just where their work will be on the following day.

After the day's work is completed the inspector fills out and signs the "final" reports and mails them to the main office. In this way an independent check is obtained and collusion is almost impossible between the inspectors and contractors as to the area of pavement to be restored. The paving company then presents its bill for this restoration work to the city and a clerk in the office uses the "final" reports as a basis on which to approve the bills.

During 1913 an experiment on patrol inspection was tried, the object being to reduce the number of patrol inspectors and put them where the work was urgent. The territory north of 59th street and west of Fifth avenue, in Manhattan borough, was patrolled by one inspector in an automobile. Previously, this section had been patrolled by twelve men. The difference in cost was:

12 Inspectors at....	$1,200	= $14,400
as compared with:		
1 Inspector at.....	1,800	
1 Chauffeur at.....	1,200	
Maintenance and depreciation of automobile	1,000	
Total		4,000
Yearly difference, or saving.....		$10,400

This covered a mileage of approximately 132 miles and gave a patrol inspection cost per annum of $30 plus per mile, as compared with $109 plus per mile by the old system, showing a saving of $79 per mile per annum, or a total of $10,400 per annum.

Although this scheme worked out well in the district where it was used, it probably would not be as effective in heavy traffic sections where the territory covered would be limited on account of congestion and where the speed of the automobile would not be an advantage.

The inspection and follow-up system referred to, which includes a number of patrol inspectors and an independent number of maintenance inspectors, has the following advantages:

(1) It places individual responsibility on the inspector on the work, as the reports must be signed by him.

(2) It makes the shifting of responsibility impossible.

(3) Possible collusion between inspector and contractor is out of the question.

(4) Experience shows that better results are obtained.

The fourth statement is easily verified by a comparison between the present state of the streets in the borough of Manhattan and their condition under the old system.

In a highway organization, the details of the inspection system are vital to a successful administration, because the success or failure of highway work depends on the field inspection. The speaker believes that the system outlined is feasible, covers all necessary requirements, and, if properly supervised, will get rid of many of the difficulties with which a city highway engineer must contend.

In the report of the Manhattan Bureau of Highways for 1912 (which has just been published) it is stated that during that year 20,716 permits were issued for 26,831 openings in pavements, of which 6,191 were to companies operating wire conduits, 7,209 to the gas company, 3,887 to various other companies and 3,429 to plumbers. This does not include openings made by the Water Department and Sewer Bureau, which openings are not under the control of the Highway Bureau. The Bureau of Sewers, as a matter of courtesy, notifies the Highway Bureau when it is about to make a cut, but the Water Department does not do so, its first notification being in the form of a notice that cuts made by it need repairing by the Highway Bureau. (It has been known to tear up a new pavement almost before the asphalt is cold, laid because the highway officials had not been informed that it contemplated early work in that street.)

"It has been found," says Chief Engineer H. W. Dur-

ham, "that great convenience to the public, as well as to this office, resulted by notifying each property owner in the street to be repaved, in advance of the commencement of the work, in order that he might arrange to make any subsurface changes before the street was paved and still further eliminate the necessity for cuts in new pavements."

No permits for openings are issued after November first until the end of the winter season, except in case of emergency, and then only after an inspection by the department to make sure that an emergency really exists.

The charges for permits are as follows:

	Per Sq. Yd.
Street asphalt	$3.50
Block "	3.50
Wood block	4.00
Granite on concrete (under maintenance)	3.50
" " " (city repair)	2.50
" " sand	1.00
Macadam	2.00

A water opening is assumed as equal to 8 square yards, and so charged; a sewer opening as 12 square yards, and crossing a sidewalk as 6 square yards. The deposit required of plumbers is divided into two equal parts, one-half for the immediate restoration of the pavement, of which any balance over the charge for the repaving done is at once returned; and the other half as a guarantee of good workmanship, which is retained for six months and used for any restoring of defective pavement due to improper backfilling.

MARQUEES vs. CANVAS AWNINGS

Ordinances and Practices in Four Cities—Relative Rights of Owner, Adjoining Owner and General Public—Department in Control.

By WILLIAM TALBOTT CHILDS.*

At Baltimore, Md., the Board of Estimate is vested with authority to grant applications for marquees. The law on this subject is found in Section 37 of the Baltimore City Charter, as follows:

"Provided, That the right to use the streets, avenues, alleys or other public property by any person or body corporate for steps, porticos, bay windows, bow windows, show windows, signs, columns, piers or other projections or structural ornaments of any character, except so far as the same may be prohibited by law, and covered vaults, covered areaways, planting of trees, drains, drain pipes or any other private purpose not prohibited by law and not being a franchise or right requiring a formal grant by ordinance under the terms of this section, may be granted by the Board of Estimates for such an amount of money and upon such terms as the said Board may consider right and proper; before said Board shall grant any such right, the person or body corporate seeking the same shall file before said Board in writing an application for such use, and in said application the use desired shall be stated and what the applicant is willing to pay for the same must be given, and such person or body corporate shall only enjoy such use on the payment of the amount of money named by said Board and on the terms and conditions said Board shall prescribe in writing, and no ordinance or advertisement shall be necessary or made in such cases as are named in the proviso of this section; provided, however, that copies of said application be served upon the adjoining property owners by said applicant before filing said application before said Board."

The Board of Estimate reserves the right to revoke at its pleasure all permits it grants and so stipulates on the application and permit forms.

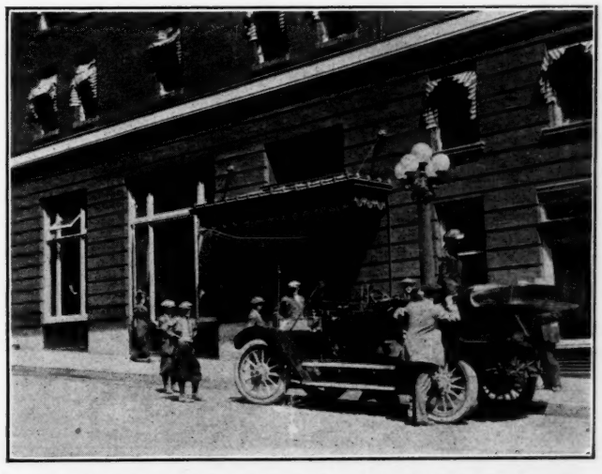
Applications are filed for marquees by all manner of private and quasi-public business concerns and corporations. It has not been an easy proposition to draw the line of demarcation as to which ones should be granted and which disapproved. The two most important points in which the Board of Estimates concerns itself in these applications and also in all applications for public franchises or minor privileges are:

1. The rights of the adjoining property owners and tenants.

2. The rights of the general public.

Frequently the adjoining property owners and their respective tenants are not in accord. Recently application was made by a manufacturer for the privilege of erecting a sign in a business neighborhood where all floors above the first floor are used as apartment houses. The application was approved, the owner of the property consenting, but subsequently the tenant of the second floor of the building objected to the sign being attached in any way to the premises occupied by him. The argument was used before the Board of Estimate that the sign should be permitted to hang because the owner of the property had consented, but the Board of Estimates thought otherwise and the applicant was told that unless he hung his sign so as not to be attached to or interfere in any way with the premises occupied by the second floor tenant, he would have to remove the sign. The sign was removed. Several weeks later, however, the same applicant came before the Board of Estimates with a new application. It was shown by the blueprint of the sign that the sign and fixtures were not to be attached in any way to the second floor of the building, that the guy ropes and other supports were to be attached either to the premises occupied by the applicant or to the adjoining properties, for all of which written permission was filed with the application. But it was shown by the blueprint that one of the guy ropes was to extend diagonally from one of the adjoining buildings to one corner of the sign, across the brick wall of the second story occupied by the objecting tenant, and, although this guy rope was not to be attached in any way to the second story, and, in fact, was to hang three feet from the wall in dispute and was not in front of a window or any opening, the Board of Estimates, while realizing that the objection was arbitrary and unreasonable, refused to grant the application on the theory that the objecting tenant has the right to the unobstructed and uninterrupted use of his property. The applicant was thereupon required to make other arrangements for fastening the sign to his own premises. While the negotiations were pending, the applicant bought the whole building, and notified the objecting tenant, much to his chagrin, that he would be required to vacate upon the termination of his existing lease.

New York City permits the erection of marquees under the following conditions:



NARROW MARQUEE AT HOTEL ENTRANCE.

*Deputy City Comptroller, Baltimore, Md.

(1) The applications are granted without charge by the Department of Buildings, which has sole jurisdiction in the matter, and are issued to any applicant upon the filing of plans.

(2) No distinction is made between applications made by business houses and hotels and those made by theatres and other places of amusement.

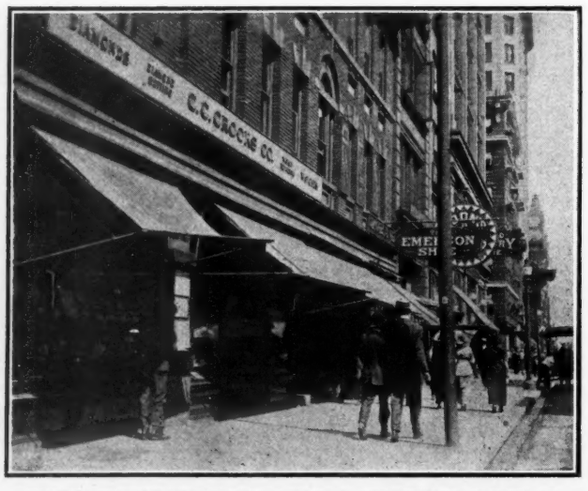
(3) The marquees must be made of metal and glass; they may be five feet wider than the entrance doors. Where there is a series of doors and the width of space between doors is not larger than the door, the marquees may be five feet wider than the width of doors. They must not extend beyond the curb, and in height must not be less than 10 feet in the clear, and be supported from the walls of the building. Sidewalk supports are not allowed.

In Boston applications for marquees are not granted as a matter of course. It is wholly within the discretion of the Street Laying-Out Department as to whether application shall be granted. Under the law passed by the Massachusetts Legislature of 1913, the Street Laying-Out Department is required to make rules and regulations governing the erection of marquees as well as signs and other projections. Boston is slow in granting applications for marquees unless the buildings are used for public purposes, such as hotels, theatres, public halls and other places of amusement. Tentative rules have recently been adopted in Boston for street signs, awnings, etc.

In Philadelphia the erection of marquees is under the control of the Bureau of Building Inspection and the supervision of the Bureau of Highways, respectively. Applications are made to the Bureau of Building Inspection, which, after investigation, if approved, issue permits, for which a charge is made from $2.00 up, based upon the aggregate cost of the structure. The functions of the Bureau of Highways extend to securing proper observance of the laws and ordinances covering the protection of the sidewalks and highways.

The present policy at Baltimore is not to grant permits for marquees except for public purposes, such as hotels, theatres, halls and other places of amusement. The charge made is 5 cents a square foot per annum. The marquees must be made of metal and glass, must not extend beyond the curb, and must not be less than ten feet above the sidewalk. They must be supported from the walls of the building, no sidewalk supports being allowed.

One exception was recently made at Baltimore to the policy herein outlined. A jeweler applied for the privilege of erecting a marquee in place of an old canvas awning. There were a number of hearings and no one ever objected to the application, nevertheless it was always disapproved, until at one meeting the applicant exhibited photographs to show clearly the contrast between his old canvas awning then hanging and the marquee desired, of iron frame construction, copper covered, with wire glass panels, and the Board of Estimates at that meeting approved the application. The Board of Estimates, however, at its next meeting made it known that this was an exception to the rule and not a precedent, and that in the future the policy, as previously defined, would be strictly adhered to.



VIEW OF JEWELER'S STORE, SHOWING CANVAS AWNING.

JEWELER'S STORE AFTER ERECTION OF MARQUEE.

The marquee was erected by the jeweler. It is ten feet above the sidewalk, 52 feet long and six feet wide. The number of square feet being 312, the per annum charge of 5 cents per square foot is $15.60.

The illustrations herewith reproduced give an excellent idea of the effect both before and after the erection of the marquee.

While the Board of Estimate at Baltimore has determined upon a policy with regard to the erection of marquees, it is quite certain that the question, like "Banquo's Ghost," it will bob up again.

MUNICIPAL THEATRES IN FRANCE.

The cities of France quite generally subsidize theatres and exercise watchful supervision over the administration. In Havre (and probably in most other cities) the director is chosen by the city council and a citizen commission passes judgment on the candidates for the leading parts. This theatre seats about 1,400. The stock company contains 10 actors and 8 actresses for drama and for light opera 22 singers and a chorus of 18. During the past few years the attendance has been diminishing, owing to moving picture theatres and the habit of the more wealthy to visit Paris; and the season of 1912-1913 showed a loss of $1,930, which the city had to pay. The Havre council a few weeks ago voted $9,650 subsidy for next winter. The prices range from 10 cents in the top gallery for all performances to from 77 cents to $1.16 for orchestra chairs, the latter price for grand opera. In 1912 Lyons gave a subsidy of $57,900 a year for opera; Lille, $21,230 for opera; Nantes, $37,635 for opera; Toulouse, $30,880 for opera; St. Etienne, $4,825 for drama, comedy and lyrics; Havre, $7,720 for drama, comedy, light and grand opera; Rouen, $23,160 for lyrics; Nancy, $14,475 for lyrics and comedy. These all have more than 100,000 population. At least fifteen other smaller cities also have municipal theatres, the smallest being Boulogne-sur-Mer, with 53,000, which gave $4,439 subsidy.

UNDERGROUND SURVEY OF SPOKANE.

An underground survey of Spokane, Wash., was begun early in 1912 under City Engineer Morton Macartney and continued during 1913, and most of the downtown portion of the city has been covered and platted. Also such information as is received concerning outlying districts is tabulated and arrangements made for preserving it, to prevent the annoyance and expense caused by the failure to do so formerly.

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APRIL 2, 1914.

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Pavement Maintenance.

In all but the smaller cities the maintenance of street pavements is a more serious and perplexing one than the construction. A large part of the maintenance and repairs is made necessary by the cuts in the pavement by plumbers for house connections, by water and gas companies and all others which are privileged to place structures under the street surface. Every effort is of course made to reduce the number of such cuts to a minimum, but they will be numerous at the best in any city which is not finally completed; and a finally completed city is like the proverbial good Indian.

The official in charge of maintaining a city's pavements must know where and when each cut is made, must see that the backfilling and repaving are restored at once and properly, and that the restored spot stays in good condition. In a small city, where only an occasional cut is made, this is not so difficult. But in a large one, where the cuts run into the hundreds every month, scattered over scores of miles of streets and alleys, it requires systematic supervision to prevent surreptitious or unauthorized cuts, to secure prompt repairs, and to ensure that the repaired spots are kept in good condition by the responsible party.

How this is done in one city which maintains 2,000 miles of paved streets is explained on another page. For a city with only fifty miles, this system would be too elaborate in some respects; but the general principles are correct. The department of public works or the city engineer should issue permits for every cut in any pavement, and any made without such permit should be punished by a heavy fine. The police should be required to arrest any person seen cutting into a pavement who cannot show a permit. Some system must be adopted for keeping track of the work, and the use of a copy of the permit as a "tickler" would seem to offer advantages of economy and avoidance of errors. Other details would depend on local conditions and methods—whether the city itself relaid the pavement or had the work done under its inspection, or relied on a bond of the parties doing the work. The essential point is to insure that the work is at all times known of and controlled by the proper official.

Still another and equally important element of maintenance is the prompt discovery and repair of conditions which should receive attention. It is conceivable that a pavement might get into a seriously worn condition without any official of the paving department being aware of the fact, although the daily papers would generally see that this ignorance did not last long. But there should be some system whereby the city official learns at least once every week or two the condition of every square yard of pavement under his control. This can be secured only by actual inspection by some one. In some cities this is one of the thousand and one things the police are expected to report, but the experience in many of them is that this source of information cannot be relied upon. Periodic inspection by a department employee on bicycle or runabout would seem to be the best solution.

Municipal Bonds.

Through an error which was discovered too late for correction, we last week quoted the Bond Buyer as saying that "there seem to be no signs of a halt in the steady decline of municipal bond prices." The word "decline" should have been "climb," the remainder of the article plainly stating that the demand for such bonds was increasing and the market value advancing.

Paving Brick Making by Convicts.

In a recent message, Governor Glynn, of New York state, advocates abandoning the general construction of bituminous surfaces for state highways and using only brick and concrete, and that the brick be made by the inmates of the state penitentiaries. His object in choosing those two materials was evidently to eliminate maintenance charges, which he claims would be achieved in this way; but many experts, unbiased by commercial affiliations, would dispute this claim. It is, at any rate, a subject for experts and not for a lay official to decide.

As to the idea of using convict labor for manufacturing brick, we hope for the sake of the state that it will not be adopted. The making of good, or even fair, paving brick is a science and an art which has been years in developing. It requires the intelligent mixing of proper raw materials under expert supervision, and burning by experienced men alert day and night to maintain proper conditions; and, finally, careful culling by men who know that particular make of brick and the meaning of each small variation in color or surface texture. Where will the state obtain these men? Assuming it secures the best of superintendents, he cannot train them from the men ordinarily found in a penitentiary, except possibly by a long process of elimination to discover the necessary combination of ability and willingness to use it. And the man so found and trained may have completed his sentence by the time his services are valuable.

Except in the excavating of the clay there is comparatively little use for unskilled labor in a modern brick plant turning out high-grade brick, and cheap, unskilled labor is all that the state has to offset the recognized handicap against efficiency which is furnished by politics and other conditions apparently inseparable from state work. It would appear as though a number of experienced men must be employed, and that the hope of saving money by this plan would be futile.

Even more serious is the probability that the output would not be up to standard, and that the roads of the state would suffer accordingly. Every combination of clays and shales found in the various localities where brick are made requires a certain treatment of its own as to mixing, burning, etc., to produce a first class brick; and this can generally be learned only by trial extending over months and years. Meantime, what would the state do with the brick turned out, and later on with the culls? Sell them for purposes other than paving in competition with the Hudson river brick makers? There would be too much pressure on the highway engineers to permit of this or of as rigid an exclusion of poor brick as is now possible. There would seem to be every reason, therefore, for fearing that poor brick would be used.

The use of prisoners for quarrying, stone crushing and making macadam and bituminous roads has proved a success in several states and might well be tried in New York on a more extensive scale; but using them for making paving brick would, we fear, be a costly fiasco.

SAND FOR MORTAR AND CONCRETE

Effect on Mortar of Mineralogical Composition, Sharpness and Gradation of Grains, and Cleanness—Suggested Specifications for Sand.

(*Continued from Page* 432.)

DISCUSSION OF TESTS.

Mineralogical Composition.—The mineralogical composition of a sand is the fundamental factor in its mortar-making qualities, since not only its durability, and hence the durability of the mortar, but the size and gradation of the grains, the nature of the grain surfaces, the strength of the grains themselves and all the other factors which affect the strength of the mortar are more or less directly dependent on the nature of the component materials of the sand.

Specific Gravity.—The specific gravity of a sand affords little information relative to its mortar-making qualities, its principal value being as a factor in certain computations.

*Sharpness.**—Angularity or irregularity of the sand grains appears to exert no effect on the tensile strength of the mortar. In compression, the sharp sands may show a slight advantage due to the interlocking of the angular grains; but evidently such action is insignificant as compared with the resistance to displacement of the grains afforded by the bond between them due to the adhesion of the cement to their surfaces; hence the strongest mortars are invariably those in which the cement most readily adheres to the sand grains. Crystalline rocks, when freshly fractured, generally show surfaces of great smoothness to which the cement does not adhere well; but when these grains have been worn down the surfaces become roughened and the cement adheres much more readily. This is particularly true of quartz, as is evidenced by the fact that rounded silicious sands usually form mortars of greater strength than similar sharp sands. For example, sample No. 21 with very sharp, glass-like grains gives only 70.2 per cent as much strength as the Ottawa standard sand with its spherical dull-surfaced grains, although the former is the better graded and the two are practically identical in composition and cleanness. With sands composed of rocks which naturally show a rough granular fracture this advantage of round grains is lost; but, in any case, mortars made of round-grained sands will compact more readily than those of sharp sands; hence such mortars in place are likely to be more compact and dense, which conduces to greater strength. The usual requirements of specifications that sands for mortar and concrete shall be sharp is not only useless but may even be detrimental and should therefore be omitted. Further, since the condition of the grain surfaces does materially affect the strength of the mortar, the specifications should fully cover this point.

Voids.—The percentage of voids in dry sand is a function of its compactness and the gradation of sizes in the sand grains, hence the effect of the voids on the strength of the mortar is included with that of the gradation of the sizes of the grains. The percentage of voids is valuable in determining the amount of cement necessary to give the densest mortar. The sands tested show voids varying from 28.5 to 39.4 per cent. The average sands contained 32 to 34 per cent when dry and well compacted.

Size and Gradation of Grains.—It has been demonstrated, both by experiment and practice, that coarse sands will yield denser mortars than fine sands, and that the maximum density is obtained when the various sizes of grains are present in the proper proportions. Just what the proper proportions are or, in other words, what the ideal form of the sieve analysis curve is has not as yet been determined. Experiments with materials for concrete indicate that for a mixture of cement, sand and stone the sieve analysis curve should approximate a parabola, and by analogy it would seem that the same should be true of a mixture of cement and sand as well. Assuming that the parabola is the ideal line for the mixture, and remembering that the cement is very fine,* it follows that the ideal line for the sand considered alone must lie *below* the parabola, and that it would be different for each proportion of cement used. But since the cement is very fine and forms a relatively large proportion in most mortars, the consequent variation in the ideal gradation for the sand considered alone will not be great; and hence it may be said that for the common proportions of cement and sand (1:1 to 1:4) the *flatter* the sieve analysis curve of the sand the denser will be the mortar made from it.

It has also been demonstrated that, other things being equal, the denser a mortar the greater is its strength; and hence the size and gradation of the grains is indirectly a factor in the strength of the mortar. Unfortunately, the fact that "other things must be equal" has been frequently overlooked with disappointing and sometimes disastrous results. It is only when the various sands are identical in mineralogical composition, condition of the grain surfaces, cleanness, etc., that the size and gradation of the grains becomes the controlling factor in the strength of the mortar, and even then it is only relative. Thus, if two sands are exactly alike in all respects except size and gradation of the grains, the better graded sand will yield the mortar of both greater density and greater strength; but this strength may be decidedly less than that of a mortar from a third sand which may be less perfectly graded than either of the two given sands, but is superior in other characteristics. Consequently we may have two sands which have identi-

*Sharpness is here used in its common meaning of angularity or irregularity in shape.

*Standard specifications require that at least 92 per cent must pass the No. 100 sieve.

cal sieve analyses and yield mortars of the same density; and yet these mortars may differ greatly in strength; or, two sands which differ greatly in their sieve analyses may form mortars of the same strength, although different in density. For example, note that samples Nos. 2 and 12 give mortars of practically the same strength, although their sieve analyses are decidedly different; while samples Nos. 13 and 32 are almost identical in sieve analysis but their mortars show a wide difference in strength.

Where strength is of the first importance in a mortar the only criterion is a direct test for strength; but after the absolute strength of the mortar from any one sand is determined, the sieve analysis may indicate whether the strength can be somewhat increased by improving the gradation of the sand. In general, this improvement must be accomplished by judicious screening rather than by the addition of other material, since usually the added material will not be of the same general character as the given sand. Where a dense or impervious mortar is required, the size and gradation of the grains is of more importance; and if strength is secondary, may control the choice of the sand. In this case the sieve analysis curves may be of considerable assistance in selecting the proper sand, or in indicating whether the desired results can be obtained either by combining several sands or by screening. In no case, however, should the direct test for strength be omitted, for a certain amount of strength is always required, and a good result for the sieve analysis is not sufficient evidence that the mortar will have sufficient strength.

The maximum size of grain permissible depends on the work for which the mortar is intended. For concrete the maximum size is now taken at ¼ inch, but certain kinds of masonry, etc., require a much smaller maximum size. The maximum size of grain fixes the limits of sieve analysis, and consequently two sands may differ greatly in average fineness, and yet each one may be more perfectly graded and hence more suitable for some particular work than the other.

In general, the sands tested were quite fine, and several of them were extremely so. The bank sands showed the greatest difference in gradation. The river sands showed less difference in gradation than the bank sands, and although the latter also showed the greatest difference in strength, this is probably due more to a greater difference in the other characteristics than to a difference in gradation. In nearly every case there was a large amount of material caught between the No. 30 and the No. 60 sieves, and it is of interest to note that this material is nearly all silicious. It is also worthy of note that practically no quartz grains were retained on the No. 16 sieve. It is therefore to be expected that silicious sands will be comparatively fine and that the coarser sands will contain considerable quantities of less brittle rocks.

Cleanness.—Foreign material in a sand may affect the strength of the mortar by retarding or preventing the hardening of the cement, by preventing the adhesion of the cement to the sand grains, and if present in sufficient quantities by simple "dilution" of the cement. Organic matter is the most common source of trouble, but inert clay and loam may prove deleterious under certain conditions.* Experiments indicate that finely divided inert clay or loam may be present in an average sand to the extent of 10 to 15 per cent without appreciably affecting the strength of the mortar, provided the clay or loam does not adhere to the grains, while a very small quantity may seriously impair the strength of the mortar if it forms a coating around the sand grains.

As would be expected, the river sands are the cleanest, showing an average of only 0.3 per cent of suspended matter, while the bank sands averaged 2.2 per cent even after omitting sample No. 18. This sand was the dirtiest one in the series. It contained 18.3 per cent of clay which adhered tightly to the grains and decreased the strength of the mortar both by its large quantity and by preventing a perfect bond between the cement and the sand grains. Sample No. 7 was the next dirtiest, containing 8 per cent of clay, but in contrast with No. 18 it did not coat the grains, and a test of the washed sand showed no increase in strength of the mortar over that of the unwashed sand, showing that even this amount of clay, when loose, had no appreciable effect on the strength of the mortar. In every case the suspended matter was inert clay or loam. It must not be forgotten, however, that appearances are deceiving and that a test is the only sure method of determining the quality of the sand or the effect of foreign matter.

Tensile Strength.—The tensile strength of the natural sand mortars varied from 140 to 464 pounds per square inch at the age of 90 days. By comparing the tensile strengths with the sieve analysis curves it will be seen that the coarser sands give the mortars of greater strength, and it will be noted that several of the sands show almost identical curves but that their tensile strengths are quite different, while still others giving practically the same strength differ greatly in their sieve analysis curves. An examination of the sands themselves shows that this variation is due to some of the other characteristics of the sands. Only five of the natural sands gave a tensile strength greater than the Ottawa standard sand; and it will be noted that all of these are bank sands with rounded grains, comparatively well graded and containing considerable material other than quartz. The river sands showed less variation in strength than the bank sands, but this is to be expected, since they differ less in composition, grading and cleanness. It may, therefore, be expected that river sands will form mortars of only moderate strength, and that there is likely to be little variation between different sands; and that bank sands will furnish the mortars of greatest strength, but that the strength from different sands will vary through a wide range.

It will be noted that in making these comparisons the tensile strength at 90 days is used. This age was chosen in that the results most nearly represent the ultimate strength of the mortars. A study of Table 1 will show that the mortars differ widely in the time required to attain approximately their maximum strength, and that the weak mortars invariably require less time than the strong mortars. This is explained by the fact that the strength of a mortar is largely dependent on the bond between the cement and sand. With poor sands the maximum bond is reached long before the cement has reached its full strength, while with the better sands the maximum bond is not attained until the cement has more completely hardened, and hence more time is required. Seven, 14, and possibly 28-day tests are therefore not absolutely reliable for comparing the ultimate strength of different sand mortars. For such comparisons the longest time available should be used. The short time tests are, however, of value in determining how soon it is permissible to remove forms or to subject the material to limited use.

Proportioning.—These tests indicate that the variation in the mortar-making qualities of sands may be so great that a stronger mortar may be obtained from a lean mixture of one sand than from a much richer mixture

*For a very interesting discussion of the effect of organic silt on mortar, see Transactions of the American Society of Civil Engineers, Vol. 65, pp. 250-273.

of another sand, and since the cement is the most expensive part of the mortar a substantial saving in the cost of materials may be effected by a judicious choice of the sand. For example, assume that a certain sand requires a 1:1 mixture by weight to give sufficient strength. If the cement cost $1.50 per barrel and the sand $0.40 per cubic yard, the materials for a cubic yard of mortar would be $6.67. If the same strength could be secured with a 1:3 mixture of another sand which costs $1.50 per cubic yard, the cost of the materials for a cubic yard of mortar would be only $4.71. Thus a saving of $1.96 per cubic yard of mortar could be effected by simply substituting a leaner mixture of a better sand, although it is more expensive. It is thus seen that the *cost per unit of strength* of mortar can be materially reduced by a proper choice of materials. The same thing likewise applies to concrete, since the strength of the concrete is governed by the quality of the mortar entering into it and also by the quality of the aggregate. Thus a 1:3:6 mixture using one kind of sand and stone may form a stronger concrete than a 1:2:4 mixture using another kind of sand and stone and the same cement. If the unit cost of the material is the same and strength is the governing factor, it is evident that a considerable saving could be effected by using the leaner mixture of the better materials, and a higher price could often be paid for these materials and still yield a substantial saving.

The selection of the proper proportions for a mortar is essentially a problem in economics, whether the result to be attained is a mortar or concrete of maximum strength, or one of the greatest density and imperviousness, or simply one of sufficient strength for the purpose in hand. The object in any case is to obtain the desired result with the minimum cost. If this fact is kept in mind it will become clear that it may really be true economy to spend what appears to be a considerable amount of time and money in investigating the available sands and determining the best combinations. Obviously, the saving to be effected varies with the magnitude of the work, and hence the bigger the job the more important it is that the materials be properly selected. If such investigations were generally made it would certainly result in reducing the careless and extravagant use of cement, the most costly material entering into mortar or concrete.

SPECIFICATIONS FOR SAND.

Need for Definite Specifications.—It is generally acknowledged that the specifications most frequently used for sand are inadequate, in that they are too brief or too indefinite to secure the desired results. Recent specifications have overcome these defects in some respects, but most of them are objectionable, in that they are too inflexible, i. e., fail to allow variations in the quality of the sand to meet varying conditions or different requirements, or else by placing undue stress on some particular requirement bar from use sands which would prove entirely satisfactory. The following specifications have been prepared with the idea of giving this necessary flexibility, and at the same time of making them sufficiently rigid. It is not intended, however, that these specifications should be used indiscriminately for all purposes but rather that they should serve simply as a guide in preparing the specifications for any particular piece of work. In preparing these specifications, both the specifications proposed by the national engineering societies and the results of the test described in this bulletin have been taken as guides.

Definition of Sand and Screenings.—The term sand shall be understood to mean natural sand which will pass, when dry, a screen having ¼ inch clear openings. Similar material which is the product of artificial crushing shall be known as screenings, and shall conform to the specifications for sand.

Suggested Classification of Sands.—Sands shall be classified as No. 1, No. 2, No. 3, plastering sand, and grout sand, the several grades being suitable for the following classes of work:

No. 1 sand is that required in reinforced concrete and in other work requiring a mortar of maximum strength and density.

No. 2 sand is that required in work not demanding maximum strength or density but still requiring a mortar of high quality.

No. 3 sand is that required where high strength or density are not controlling factors.

Plastering sand is that for use in ordinary plastering over masonry, concrete, and wood or metal lath. Either No. 3 sand, or plastering sand, is of high enough quality for use in lime mortars. The latter sand should be used where the thickness of the mortar joint is such as to require grains of small size.

Grout sand is that for use in pavement fillers and other work requiring a thin, smooth, free-running grout.

SPECIFICATIONS FOR NO. 1 SAND.

Composition.—No. 1 sand shall consist of grains from hard, tough, durable rocks, and be free from soft, decayed, or friable material.

Cleanness.—The sand must be free from lumps of clay, loam, or other foreign material. It shall not contain more than 2 per cent by weight of finely divided clay, loam, or other suspended matter when tested by washing in such a manner as to remove all such material without removing any of the finest sand; provided, that if the strength of the mortar made from the sand is greater than 110 per cent of the strength of a similar mortar made with standard Ottawa sand, the amount of suspended matter may reach 3 per cent This suspended matter must not form a coating around the grains to such an extent that such coating is not entirely broken up and removed from the grains by sprinkling with water or in the mixing of the mortar or concrete. The sand shall be free from oily or greasy matter in any form and must contain no organic silt.

Roughness.—The grains shall have rough, unpolished surfaces to which the cement paste will readily adhere.

Size of Grains.—The grains shall be well graded in size from the finest to the coarsest. For the greatest density not more than 8 per cent by weight, including the suspended matter, shall pass the No. 100 sieve, and not more than 60 per cent the No. 16 sieve. If maximum density is not essential and the mortar yields the required strength, these quantities may be increased to 12 per cent and 75 per cent, respectively.

Voids.—The voids in the dry sand, when well shaken, shall not exceed 33 per cent of the total volume of the sand.

Tensile Strength.—Mortar, in the proportions of 1:3 by weight, when tested at an age of 28 days shall develop a tensile strength at least equal to the strength of a similar mortar made of the same cement and standard Ottawa sand tested at the same age.

SPECIFICATIONS FOR NO. 2 SAND.

General Requirements.—No. 2 sand shall meet the requirements for No. 1 sand in all respects except as follows:

Cleanness.—The suspended matter shall not exceed 6 per cent by weight when tested in the same manner as described for No. 1 sand.

Size of Grains.—Not more than 15 per cent by weight, including the suspended matter, shall pass the No. 100 sieve, and not more than 80 per cent. the No. 16 sieve.

Voids.—The voids shall not exceed 35 per cent of the total volume.

Tensile Strength.—The tensile strength shall equal at least 80 per cent. of that of the Standard Ottawa sand mortar when tested as described for No. 1 sand.

SPECIFICATIONS FOR NO. 3 SAND.

No. 3 sand shall meet the requirements of No. 2 sand, except that the suspended matter may reach 8 per cent and the tensile strength be as low as 65 per cent of that of the standard Ottawa sand mortar.

SPECIFICATIONS FOR PLASTERING SAND.

Plastering sand shall meet the requirements for No. 3 sand in all respects except that for the finishing coat it shall be of the requisite fineness to give the desired finish.

SPECIFICATIONS FOR GROUT SAND.

Grout sand shall meet the requirements for No. 3 sand except as follows:

It shall all pass a No. 16 sieve. The voids shall not exceed 38 per cent of the total volume. The tensile strength shall be at least 40 per cent of that of the standard Ottawa sand mortar.

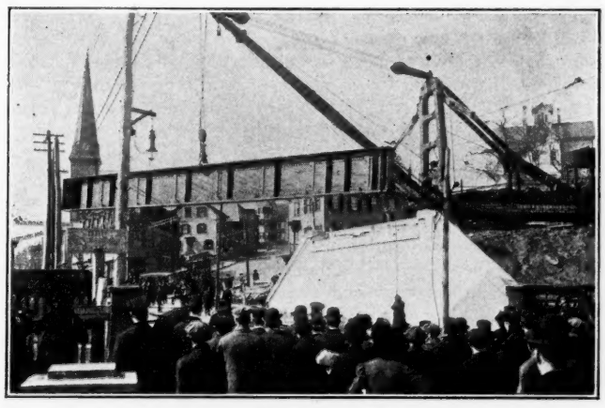
The WEEK'S NEWS

Plan National Highway—Clean-up Campaigns in Thirty States—Water Works of Lenox (Ia.) Completed—Favor Two-Platoon System in Massachusetts—Motor Fire Apparatus Installed in Many Cities—Commission Rule in Trenton Economical—St. Paul (Minn.) Cuts Expenses With Auto Sprinkler.

ROADS AND PAVEMENTS

Eliminate Grade Crossing in Providence.

Providence, R. I.—Two iron girders were placed on the concrete abutments at Plainfield street, which will support tracks from the viaduct nearby and thus carry the railroad traffic over one of the main highways in Providence. Several futile attempts were made to place the girders, the cap



Courtesy the Providence Journal.
PLACING GIRDER ON CONCRETE ABUTMENTS.

on the crane snapping in the first effort, thus causing the girder and part of the hoisting machinery to drop to the ground. Before the girders were finally laid, the embankment near the hoisting machinery was found to be sliding away. A firmer foundation was made and the work proceeded smoothly.

Governor Designates "Good Roads" Day.

Springfield, Ill.—In a proclamation recently issued, Governor Dunne has taken official cognizance of the good roads' movement in Illinois by designating April 15 as "road day" throughout the state. In part the governor said: "Perhaps no subject has more thoroughly aroused the people of Illinois to action than has the question of improvement of our wagon roads. In Illinois, we are entering upon a new era of road improvement. The new road law of the state, one of the most comprehensive under which any state is acting, has become operative. It is important that local highway commisisoners, county superintendents of highways, good roads organizations and commercial clubs, in their respective communities, unite to carry out this work so as to give the greatest number of citizens an opportunity to celebrate the observance of 'road day' by practical work on the roads, such as road dragging, grading, draining, hauling and placing gravel, stone or other road material."

To Co-operate for Better Roads.

Hazleton, Pa.—Complying with the provisions of the Jones act, the commissioners and supervisors of all the townships in Luzerne county have met and effected a permanent organization by the election of officers. The meeting was held in conjunction with officers of the State Highway Department, and the purpose of the new organization is to work in accord with the state department for the improvement and betterment of roads and bridges, and to adopt methods of economy and co-operate with the various townships and the state for the making of permanent road improvements and for increasing the appropriations for the same. The following officers were elected: President, Adam Stock, of Kingston Township; first vice-president, William Bauscher, of Conyngham Township; second vice-president, Benjamin Gilmore, of Plains Township; secretary, W. M. Major, of Lehman Township; treasurer, Lewis Martz, of Plains Township.

National Highway Planned.

St. Joseph, Mo.—Good roads advocates of the middle and western states have met in St. Joseph and organized the Pikes Peak Ocean-to-Ocean Highway Association, which contemplates a national highway from New York to San Francisco. Officers and directors were elected, plans were made for carrying on the work, and St. Joseph has been chosen as the meeting place for 1915 of the association. The highway is expected to become the great central way across the United States. There is already a road laid out from Springfield, Ill., to Hannibal, Mo.; another from Hannibal to St. Joseph, called the White Cross trail, and one from St. Joseph to Colorado Springs, the Rock Island highway. From Colorado Springs to Salt Lake City is the Pikes Peak route, which will also be considered in the proposed national highway. Steps have been taken for a road from Salt Lake City to Oakland and San Francisco. The road from New York will be by way of Washington, Wheeling, W. Va.; Columbus and Dayton, Ohio, and Indianapolis and Terre Haute, Ind., to Springfield, Ill. Much of the highway has already been improved.

Spend Over Million on Arkansas Highways.

Little Rock, Ark.—Highways costing in the aggregate over one and a quarter million dollars are in course of construction in six counties of the state under the immediate supervision of the State Highway Commission. There are nine districts involved, with a total mileage of 309 miles, and in some of them the contracts have already been let and the work has commenced. The highways are all of the advanced type of macadam construction. The districts are located as follows: Pulaski county, two districts, 25 miles; Lonoke county, two districts, 15 miles; Jackson county, county highway system, 195 miles; Greene county, one district, 25 miles; Lincoln county, two districts, 34 miles; Garland county, one district, 15 miles; total, 9 districts, 309 miles. At an average cost of $4,000 per mile, this represents an outlay of $1,236,000 for actual good roads construction.

Ohio's Road Fund Increasing.

Columbus, O.—Ohio now has $941,792.66 in the good roads fund, which has been turned in by counties from the half mill levy under the Hite law, according to State Auditor Donahey. Many of the large counties have not yet certified their amounts, so that the total, the auditor stated, will reach about $1,500,000. This is only the first settlement. The second settlement will bring a much larger amount into the state road fund.

Get Large Appropriation for Highway.

Saranac Lake, N. Y.—The Assembly has passed a bill introduced by Assemblyman A. Macdonald, of St. Regis Falls, appropriating $5,000,000 for immediate work on the highway between Saranac Lake and Lake Placid. Work, it is expected, will be started in October.

Auto License Sum Refused for Road Work.

Harrisburg, Pa.—Mandamus proceedings have been instituted by the attorney general's department on behalf of the highway commissioner, E. M. Bigelow, against Auditor General A. W. Powell and State Treasurer R. K. Young requiring them to show cause why they should not make payments out of money received from licensing of automobiles. The writ was made returnable on April 6. This is the second to be brought for the purpose of securing pay-

ment of automobile revenue for the use of the state highway department. An action was brought last fall and the auditor general answered that the act of 1913 making new regulations for licensing of motor vehicles did not take effect until December 31. The recent action is based on a demand made on February 16 for payment of $1,035 for limestone for the use of a highway department, the money to be taken out of the revenue from automobiles, which the highway commissioner contends is appropriated to his department by the act of the last year. The auditor general refused to make payment contending that the specific appropriation act forbade it.

Law Blocks Use of $60,000 for Roads.

Chicago, Ill.—Members of the county board committee on roads and bridges have been informed that $80,000 appropriated for the work of which they have charge would be available only for bridges. For that purpose, Commissioner Berg declared, $20,000 would be ample. This leaves $60,000 idle, unless it can be used in co-operation with the state board of highway commissioners, with whose members a conference will be arranged soon. W. F. Struckmann, an assistant state's attorney, acting as legal adviser for the committee, declared that the referendum provisions necessary before road building could be undertaken by the use of the money made such use practically impossible.

Testing Asphalt Expansion Block.

Salina, Kans.—Experiments are now being conducted at the city hall with an asphalt expansion block for possible use in the new paving to be put in in Salina. This block of asphalt is pliable and would be placed on all pavement between the regular street paving and the cement gutter. Its composition would permit of the expansion of the paving with the heat or cold and would prevent cracking and uprisings in the pavement to a great extent. In the past a small opening has been left, but this has generally been filled with sand and this lost its value with resulting damage to the street. The new expansion block may remedy this defect, and so far it has withstood the tests made as to heat and cold.

Contract Road Work Considered Better.

Somerville, Tex.—After many years' experience with superintendents and regular road gangs, Burleson County officials have come to the conclusion that the system in vogue so long does not pay, and in the future all road work and bridge construction will be done by contract. With the object in view of contracting for all road and bridge work in the future as a cheaper method, some 50 good draft mules, a number of wagons and other material owned by the county have been sold to the highest bidder.

Hold Road Building Conference.

Janesville, Wis.—Sixty or more road builders, contractors and township chairmen were present at a conference called by Highway Commissioner C. E. Moore at the suggestion of the state highway commission, at which plans for the 1914 road work were thoroughly discussed and gone over. F. M. Balsley of the highway commission made an address to the men in regard to plans and specifications of state aid highways. Mr. Moore also gave a short address pertaining to road matters in Rock county, and the men present were given an opportunity to ask questions.

Bill to Speed Grade Crossing Elimination.

Trenton, N. J.—The Senate has passed Senator Edge's bill requiring railroads to provide protection at every grade crossing of the state within a year. The measure is designed to hurry the protection, which under the present system of grade crossing elimination might not come for many years. The bill gives the Public Utilities Commission authority to order the protection and gives the railroad companies the right to submit plans for such protection to the commission.

Will Strengthen Bridges.

Concord, N. H.—At a meeting of the board of public works a discussion has been held concerning the new law requiring the cities and towns to strengthen the bridges and culverts so that they will hold loads whose weight is ten tons. It goes into effect soon, so that immediate action on the part of the city was necessary. The discussion was led by B. W. Couch, who appeared for the board of control and asked that the railroad bridge on Bridge street be strengthened.

Permit Convict Labor on Road Building.

Albany, N. Y.—Three bills designed to extend the use of convict labor in the construction and maintenance of state highway have been signed by Governor Glynn. The measures provide for a plan whereby local boards undertaking to build or improve a roadway request the state superintendents of prisons for the assistance of prisoners, and that official must supply them if they are available.

SEWERAGE AND SANITATION

Extend Sewerage System.

Ballinger, Tex.—The Sanitary Sewerage Company has a large force at work extending the sewerage mains to certain sections of the residence district that heretofore have been without sewerage connection. The new improvements will make Ballinger a more sanitary town, and the campaigns being waged for a cleaner town have been very successful. Plans are under way for a fly-swatting campaign during the early spring and summer.

Make Survey of Potomac River.

Washington, D. C.—Public health service officials who are aboard the yacht Bratton making a sanitary survey of the Potomac river and Chesapeake bay have, according to report, taken between 1,500 and 2,000 samples of Potomac water for examination and analysis, and it is stated that it will be several weeks before the results of the survey are completed and ready for publication. In connection with the work being done by the Bratton on the navigable portions of the Potomac H. P. Letton of the public health service is at Hagerstown, Md., and is conducting the work of examining the headwaters of the Potomac to ascertain their sanitary condition and the effect the sewage and wastes from the large tanneries and other industries on the upper river are having on the water coming down past this city. It is stated that one of the objects the service has in making this survey is, if possible, to find some use for the various kinds of refuse from the manufacturing plants and to show how they can be turned into a source of profit instead of being allowed to pollute the Potomac water.

Order All Sewer Connections Made.

Austin, Tex.—Sewer connection must, according to an ordinance enacted early last month, be made by all property owners as early as possible. Already twenty-seven property owners have been notified. Printed in pamphlet form, the ordinance will be distributed to all property owners. The city has made 477 sewer connections since the city plant was taken over. Three hundred and sixty-three were made last year and 114 since the first of this year. City Engineer Welborn said that the city would attempt to extend the sewer service until every piece of property in Austin is connected.

Must Buy Sewer Material Through Purchasing Agent.

Atlanta, Ga.—Taking the position that the recently created purchasing department of the city should purchase all supplies of whatever kind, just as the ordinance creating the department provides and requires, Mayor Woodward has vetoed a resolution passed by general council authorizing the construction department to advertise for bids on the materials to be used in street and sewer construction work during the year 1914. In the past it has been customary for the construction department to prepare the specifications for these materials, get the bids, and turn the bids over to the street committee and the sewer committee of general council for them to open.

Sewer Commission Declared Illegal.

Martinsburg, W. Va.—Declaring that the ordinance passed by the city council of Martinsburg, creating the

commission to construct the new quarter million dollar sewerage system here and delegating discretionary powers to the commission was not permitted under the city charter, Judge Woods in the Circuit court here has issued an injunction restraining the sewerage commission from proceeding further toward the construction of the system. Several months ago council placed the entire matter of the construction of the sewerage system in the hands of the committee, and the court decided that the delegation of this power on the part of the council was illegal.

Clean-up Campaign in Thirty States.

Washington, D. C.—Following the lead of Washington and other cities which three years ago inaugurated the clean-city movement, municipalities in more than thirty states are planning this spring to wage similar campaigns against filth and disease. According to information received by Dr. Arthur L. Murray, secretary of the local clean-up committee, the following are some of the cities which are to conduct sanitary crusades: Forest Dale, Utah; Austin, Tex.; Richmond, Va.; St. Augustine, Fla.; Salt Lake City, Utah; Bath Beach, N. Y.; Philadelphia, Pa.; Denver, Col.; Jersey City, N. J.; Grand Rapids, Mich.; New Orleans, La.; Worcester, Mass.; Springfield, O.; San Diego, Cal.; Indianapolis, Ind.; Spokane, Wash.; Providence, R. I.; Toledo, O.; Los Angeles, Cal.; Dallas, Tex.; Union, N. J.; Trenton, N. J.; Tampa, Fla.; Louisville, Ky.; Omaha, Neb.; Elizabeth, N. J.; Minneapolis, Minn.; Paterson, N. J.; Waco, Tex.; Dayton, O.; Rochester, N. Y.; Boston, Mass.; Topeka, Kan.; Galesburg, Ill.; New York, N. Y.; Des Moines, Ia.; Jacksonville, Fla.; Sioux City, Ia.; Hartford, Conn.; Cincinnati, O.; Texarkana, Ark.; Greenwich, Conn.; Pawtucket, R. I.; Danbury, Conn., and St. Louis, Mo.

Launch Campaign to Exterminate Flies.

Greensboro, N. C.—A fly extermination campaign has been launched by E. P. Greensboro, assistant city health officer. It is asserted that 90 per cent. of the insects are bred in horse stables, so that those in charge of the campaign will be very insistent on having all stables kept clean. The hearty co-operation of all officials has been promised in making this fight on the fly effective.

WATER SUPPLY

Demonstrate Filtration Methods By Miniature Plants.

Salem, Mass.—Both the sand and mechanical methods of filtering water were interestingly demonstrated by Engineer H. M. Pirnie. Two plants in miniature had been constructed which gave Mr. Pirnie an excellent opportunity of showing state and city officials of Salem and Beverly just how each process operates and its relative advantages. The two cities mentioned are soon to use water from the Ipswich River, and the question of efficient filtration has received serious attention.

Condemnation Area Restricted in Providence Water Project.

Providence, R. I.—The City Council committee on an increased water supply has cut down its original estimate of the land needed for the installation of the new system by over 5,000 acres, the partial survey of Engineer Samuel C. Gray, leaving the best part of Scituate untouched. Under the reduced condemnation plan several churches and the majority of the houses will be left as they are. One of the chief arguments against the proposed condemnation plan was that it took very much more land than was needed, but the present plan is practically the final one of the committee, which has endeavored in every way to do justice to the people of Scituate.

Complete Water Works.

Lenox, Ia.—This town, with a population a little in excess of 1,000, has completed its waterworks, said to be one of the best for a city of its size in Iowa. An artificial lake has been located about one mile from the town in which water is impounded by means of a dam. About 12 acres of land will be covered with water when the spillway is reached and the capacity of the lake is between twenty and thirty million gallons. The extreme length of dam is 670 feet, the width at base being 87½ feet and about 20 feet at the top, with a 6-inch concrete core reaching from the top to 4 feet below the ground surface. From the lowest point the dam is 30 feet high. In the rip rap, 2,037 yards of stone were required. There are 13,950 cubic yards of filling in the dam. The filter and pumping plant building is 18x20 feet, 13-inch brick walls with concrete foundation. The Pittsburg filter installed has a capacity of 168 gallons per minute. The pumping will be done by the Lenox Electric Light Co. The motor is equipped with a high tension starter. A 6-inch main carries the water to the town reservoir, the distance of about one mile. The water tower frame is of steel and supports a steel reservoir of 50,000 gallon capacity. The riser pipe is five feet in diameter and has a 25,000 gallon capacity. The top of the reservoir is 125 feet from the ground and this should insure sufficient pressure for any needs of the town.

Operating Charges 4.93 Per Cent. of Water Earnings.

Altoona, Pa.—The total receipts of the Altoona water department during the fiscal year now drawing to a close have been $142,152.98, while the actual cost of operation has been but $7,018.20. The latter figure includes the salaries of the officials in charge and office expenses. This amounts to but 4.93 per cent. of the revenues. The remainder, with the exception of $32,000 which will merge, was expended in extending the system and in meeting interest and sinking fund obligations. Since he assumed office and the general charge of the water bureau, Director H. J. Cornman, of department of parks and public property, has been gathering information concerning the operations, the cost, etc. He finds that there are now 89.3 miles of pipe in the city, not including service connections; 1,888 valves and 814 fire hydrants.

Receive 1,900 Water Meters.

Ithaca, N. Y.—The first installment of the 1,900 water meters, with which the Meter Department of the Board of Public Works is to change the entire water system, has arrived. The active work of installing the meters will be begun by J. W. Bishop, head of the department, and an extra force of men within a few days. When the 1,900 meters are installed there will be 3,400 meters in the water system here. Every house supplied with city water will be charged through the meter system only.

STREET LIGHTING AND POWER

Progress on Lighting Plant.

Barberton, O.—Miller Stahl, superintendent of the light and water plant, has announced that the new municipal lighting plant will be ready for operation about May 1. Much work remains to be done, and it will take some little time to get everything in readiness to light the city from one end to the other. The poles for the outside wiring are not all in yet and there are also some secondary lines to be strung. At the plant workmen are busy installing the large turbines and generators, and it will be at least two weeks, it is said, before they will be ready to test out. An expert will be sent here to do the testing. The lights for residence streets are being put in as fast as possible, and it is hoped to have these in as soon as the plant is ready to run.

FIRE AND POLICE

Board to Review Police Appeals.

New York, N. Y.—Mayor Mitchel has anounced that he had appointed a Board of Police Review, the members of which are Corporation Counsel Polk, Arthur Woods, the mayor's private secretary, and Police Inspector John Daley. This is the mayor's first move in his proposed reorganization of the Police Department, and it follows the defeat of the so-called Goethals Police bill at Albany a few days ago. The board will investigate all applications made by dismissed policemen for a new trial, and will advise the mayor as to what action he should take in such cases. In explaining the appointment of the board, the mayor said that it was manifestly impossible for him to read all the records, some of which covered more than 1,000 pages.

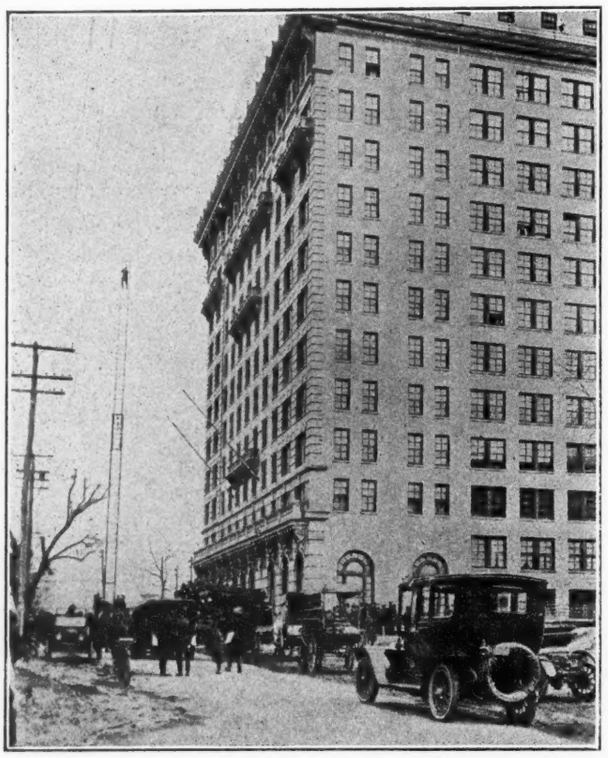
Favor Two Platoon System.

Boston, Mass.—The Committee on Cities has reported a bill to provide for a two platoon fire system in Boston and all cities of more than 50,000 inhabitants. It provides that in all such cities the force shall be divided into day and night groups, which forces shall alternate every fourth day. Emergency calls, it is provided, will bring out the entire force. The measure has a referendum. On the petition of 25 per cent. of the voters of all cities affected, except Boston and in Boston on the petition of 15 per cent. of the voters, the question shall be placed on the ballot for acceptance.

MOTOR APPARATUS

Demonstrate Boyd Truck.

Wilmington, Del.—The new automobile aerial hook and ladder truck, recently installed by the Delaware Fire Company, was demonstrated by H. E. Voortman, of James



Courtesy Wilmington (Del) Star.
DEMONSTRATION OF AERIAL LADDER.

Boyd & Bro., Inc., builders of the truck. It required just 37 seconds to hoist the ladder to a vertical position by electric power, and then the extension was raised by hand to a height of 90 feet. While at its fullest height, Voortmann mounted the ladder to its highest rung. Afterward, the ladder was swung toward Hotel Du Pont, shown in the illustration, and touched the seventh floor.

Motor Fire Apparatus Received.

Stockton, Cal.—Of the four motor fire trucks ordered by the city, one of the two Seagraves has arrived and passed a satisfactory test by the underwriters. Two combination chemical and hose wagons are expected to be delivered soon by the American La France Company and the White Company.

Seagrave Truck Inspected.

North Attleboro, Mass.—The new Seagrave combination chemical and hose truck purchased for the fire department has been received and inspected. It is a six-cylinder, air-cooled machine, of 80 horse power, rated to go 65 miles an hour, and carry comfortably 16 men. It weighs five tons and is 26 feet long. It carries two 35-gallon chemical tanks, two 3-gallon chemical tanks, auxiliary cases for soda and acid and 200 feet of chemical hose. There are 1,200 feet of two and one-half inch hose, one 30-foot extension ladder, one 18-foot ladder, one 12-foot collapsible ladder and the following minor accessories: Two plaster hooks, two axes and a door opener, two crowbars, four extra nozzles, two protected lanterns on either side, a wire basket for rubber coats and hats and a 15-gallon tank for gasoline.

Order American La France Truck.

Decatur, Ga.—An $8,000 motor fire truck has ben ordered from the American-LaFrance Company by council. The truck will be equipped with twelve hundred feet of two and a half inch hose, a forty gallon chemical engine, a gasoline pump and hook and ladder. It will be delivered within ninety days. This modern fire equipment will mean a saving of about fifteen per cent. in insurance premiums to the property owners in Decatur, in addition to the increased protection that it will afford their property.

Will Continue Motorizing Fire Department.

Cuero, Tex.—An inspection has been held of the Cuero fire department, with all men and apparatus on hand. The equipment of the Cuero department consists of two automobile hose cars, hand carts for hook and ladder and hose, ladders, buckets, four extinguishers and 1,800 feet of hose. A contract has been made for the purchase of a new motor car to be used as a hook and ladder truck, equipped with a large chemical engine, in adition to the Seagrave latest improved extension ladders.

Officials Visit Fire Motor Apparatus Factories.

Scranton, Pa.—Mayor Jermyn, Director Derby and Assistant Fire Chief Rosar are back from their tour of inspection of factories making motor-driven fire apparatus, and are confident that the cities visited have nothing on Scranton when it comes to discipline and efficiency in the fire departments. Cleveland, Trenton and Philadelphia were visited. At Cleveland they visited the Peerless factory, and at Philadelphia the Boyd factory, while in Trenton they witnessed a demonstration of the triple piece, three of which will be purchased for this city. In Cleveland they also saw an aerial truck in operation.

GOVERNMENT AND FINANCE

Commission Rule Effects Great Saving.

Trenton, N. J.—That commission government in this city has resulted in a great saving to Trenton is shown by the official effciency report recently issued. In salaries the report shows that $21,075 were saved the taxpayers as compared with the salary budget under the last year of the councilmanic government. In administration expenses $16,471 were saved by the department of public affairs, while the department of public safety eliminated $5,000 from the cost of its administration. When the commissioners took office the city's floating debt was $817,000, and this has been reduced to $421,000. The revenue deficit of the city when the new government began was $61,807.39, now it is $16,-045.55. The delinquent tax collector has collected $75,000 in back taxes during the life of the commission, without expense to the city.

To Have City Manager.

Seattle, Wash.—The commission of fifteen freeholders, formulating a new city charter to be submitted to the voters next summer have decided by a vote of 10 to 3, two members being absent, to draw a charter providing for the city manager plan of government, the manager to be chosen by a council of 30 elected by wards.

Will Amend Purchasing Department Ordinance.

Atlanta, Ga.—Dissatisfied with the manner in which purchases for the city are now made by the purchasing department, members of the general council have started a movement to overhaul the department by amending the ordinance under which it is created. This ordinance provides that all supplies for the city shall be purchased by a purchasing agent, which officer is created by the ordinance, and provides that the purchasing agent may call in the mayor, the chairman of the finance committee of council and the comptroller as an advisory committee. The result is that the various departmental boards of the city have had

no hand in the purchase of any supplies, materials or equipment for their respective departments, and this is where the objection enters and where the dissatisfied council members propose to make a change. They propose to draft an entirely new ordinance, providing that the purchasing agent shall call in as an advisory committee the board controlling the department for which the purchases are made. Thus in making purchases for the fire department the purchasing agent would call in the chief of the fire department and the board of fire-masters.

English City Adopts Commission Government.

Leeds, England.—This city has adopted the commission form of government in an effort to effect better co-ordination in labor matters between the various municipal departments, and to eliminate inefficiency among city employees.

Elect City Manager.

Amarillo, Tex.—The Amarillo City Commission has selected a city manager for Amarillo. Upon motion, M. H. Hardin has been elected to the office, and his salary, fixed at $2,500 per year. Mr. Hardin has been notified of his election, and signified his acceptance of the office.

Elect Commission Government.

Greenwood, Miss.—The election here on a proposal to inaugurate the commission form of government has resulted in a good majority in favor of the new government.

Adopt Commission Government.

Fond du Lac, Wis.—At a special election Fond du Lac has adopted the commission plan of government by a vote of 1,915 for to 1,314 against. Ten wards voted for and six against the proposition. The campaign was managed by a committee of citizens known as the "2,000 committee."

STREET CLEANING AND REFUSE DISPOSAL

Saving With Auto Sprinkler.

St. Paul, Minn.—City Engineer G. H. Herrold, of this city, has received a communication from City Engineer West, of St. Cloud, in which he asserted that the Saurer street sprinkler has saved St. Cloud $20 per day during last year. Mr. West says that the district sprinkled in 1912 by the aid of seven teams was somewhat smaller than that sprinkled by the Saurer and two teams in 1913, and that the latter service was more satisfactory. In seven months, according to a tabulated report, the sprinkler used 2,822 tanks of water and covered 2,833 miles. Besides this, it was used as the motive power in dragging 279 miles of roadway. The consumption of oil amounted to 227 quarts and 1,083 gallons of gasoline were used. The cost of repairs was $4.35. The cost per mile to run the truck was: Gasoline, .061; oil and grease, .006. The high cost of gasoline per mile is said to have been due to the dragging.

Will Flush Streets.

Dayton, Ohio.—Down-town streets will not be sprinkled this summer, but they will be flushed twice a week at night. This decision has been reached by Street Superintendent Martin after a conference with Service Director Barlow and City Manager Waite. It has been concluded that the flushing system will be more satisfactory because of the great amount of dust that arises after the paving becomes dry, which usually follows a comparatively short time after the sprinkling process is completed. Especially is this the case, it is pointed out, on intensely hot days. The streets on the outskirts of the city will be sprinkled just as they were last summer, excepting in those instances in which another method may be adopted by the owners of property abutting on any particular thoroughfare.

To Keep Tab on Wagon Men.

Scranton, Pa.—City employes on the ash and garbage wagons will have to be on the job all the time and never loaf. Mr. Mantz, who is superintendent of the garbage and ash bureau of the public works department, had a conference with Director Hayes, and at its close vouchsafed the information that a scheme is being evolved whereby it will be possible for the superintendent to always know just where the ash and garbage wagons are supposed to be at certain hours of the day. The system is being worked out, not to spy on the men but to enable the superintendent to get into quick communication with any driver needed in an emergency or to know to what point he can send men to meet the wagons in case of emergency. There are thirty ash and garbage routes in the city.

Begin Construction of Garbage Incinerator.

Greenville, S. C.—Two engineers of the Nye Incinerator Company, with headquarters in Macon, have arrived in the city and will begin work at once on the municipal crematory. It will be located near the city stockade and will be completed about April 15. It will cost about $3,500 when completed. City garbage officials will have offices in the neighborhood of the plant.

Wire Incinerators for Parks.

Birmingham, Ala.—Two dozen wire incinerators for use in the public parks have been purchased by the city from the John W. O'Neill company, and will be distributed to the parks within a few days. The incinerator is in use in many other cities, it is claimed. It is simply a good-sized wire cage, made of strong heavy material and encased in a strong, heavy iron frame. The cage has a top to it to keep the paper and trash from blowing away. When it becomes full, a match is simply touched to it and the contents in a few moments become ashes.

RAPID TRANSIT

Advocates Trackless Trolley System.

Fort Dodge, Ia.—To avoid the tearing up of pavements by eliminating tracks, Secretary Bryant advocates a trackless trolley system, with cars of a carrying capacity of 56 people, which could be run at a low cost of operation. Mr. Bryant does not see why the trackless trolley would not solve the street railway problem for Fort Dodge. It is in successful operation in many European countries, but is just being introduced here. In German cities, in Leeds, England, in Glasgow, Scotland, and in Norway and Sweden, the trackless trolley is taking care of the street car traffic with entire satisfaction. There being no rails to carry a ground circuit, the cars are operated on a return circuit consisting of a double system of wiring. The cars are so designed that they may be swerved in either direction a distance of ten feet, retaining connection with the trolley wires. This allows them to pass traffic and to meet and pass each other. The gearing of the cars runs in oil, making them practically noiseless, the wheels are rubber tired, and do not injure the pavement.

MISCELLANEOUS

Demonstrate Pulmotor.

Attleboro, Mass.—A demonstration of the new pulmotor, which has been purchased by the Attleboro Gas Light Company and turned over to the custody of the board of health, has been given in the South Main street fire station by O. L. Goudy, a representative of the Draeger Oxygen Apparatus Company of Pittsburgh, Pa., from whom the machine was purchased. Many doctors in town, members of the fire department, and members of the police department, were present at the demonstration, which was practical and instructive. All three members of the board of health were present.

Plan Flood Prevention.

Chicago Heights, Ill.—Owing to recent rain a large section of Chicago Heights was badly flooded. Now that the flood has lessened somewhat arrangements were made to rush to early completion a storm sewer to take care of the rains of the early spring. Bids for the sewer have been let and actual work will begin in a few days. The flood caused little inconvenience to the people of the submerged district, but the fear of an epidemic increased as the water fell. Streets in the flooded district are little better than mudholes and it is expected that it will be several days before they are dry enough to be used. Planks and improvised walks have been built over the mud, and these afford the only means of reaching many dwellings.

LEGAL NEWS

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Assessment—Objection by Property Owner.

City of Shreveport v. Shreveport Traction Co.—The question of the right of the owner of "abutting" property to contest a local assessment for the paving of the street upon which his property abuts, upon the ground that the property is not benefited, or that the benefit is not as great as that derived by other property, has been settled adversely to that contention by repeated decisions of this court and of the Supreme Court of the United States.—Supreme Court of Louisiana, 64 S. R., 414.

Bonds—Proceedings to Validate.

Harrell et al. v. Town of Whigham.—Where statutory proceedings are brought for the purpose of validating municipal bonds, under Civil Code, 1910, and are contested by citizens who become parties thereto and deny the truth of the substantial allegations of the petition, the burden is on the state, acting through its solicitor general, to prove the material facts which are requisite to obtain validation; and, where there is a total absence of such proof, it is error for the court to render judgment validating the bonds. —Supreme Court of Georgia, 80 S. E. R., 1010.

Annexation of Territory—Construction of Statute.

Red River Valley Brick Co. et al. v. City of Grand Forks et al.—The statute referred to, and providing for the annexation of adjacent territory to an incorporated city, must be strictly construed under the doctrine of Stern v. Fargo, and because, if valid, it grants cities most extraordinary power, by permitting them to annex territory in direct opposition to the wishes and protests of all the people whose interests are to be affected, and because this power is only granted upon a condition precedent that the statute shall be complied with.—Supreme Court of North Dakota, 145 N. W. R., 725.

Lighting Company—Vested Right—Impairment.

Ex parte Keppelmann.—A gas and electric light company, having pipes in a street at and before the amendment of Section 19 of Article 11 of the Constitution, October 10, 1911, providing that persons or corporations may operate works to supply the people of a city with water, etc., on such conditions and under such regulations as the city may prescribe, had a vested right to occupy such part of the street and to make necessary repairs on such pipes which could not be impaired by the amendment to the Constitution.—Supreme Court of California, 138 P. R., 346.

Actions—Presentation of Claims.

Williams v. City of Seattle.—A city by a written contract agreed to pay a specified price for certain buildings and improvements on land condemned by it, the contract further providing that the owner should retain possession, rent the premises, collect the rents, and apply the net proceeds on the purchase price, and that unless the price was so paid, it would be paid at the time the city took possession of the improvements or sooner if they should be destroyed or abandoned. The buildings and improvements were destroyed by fire, and the owner brought suit for the contract price. Held, that the action was one on a contract and not for damages, within a provision of the charter that all claims for damages must be presented to the city council and filed with the city clerk within 30 days.—Supreme Court of Washington, 138 P. R., 300.

Resolution for Street Improvement—Itemized Estimate.

City of Waukegan v. Wetzel et al.—A resolution of a city's board of local improvements for a street pavement and combined curb and gutter, to be paid for special assessment, does not sufficiently itemize the estimated cost, the narrative part of the estimate stating such curb and gutter is to be laid on six inches of cinders, and the only item in respect thereto being, "11,000 lineal feet of concrete combined curb and gutter in place, at 60c. per lineal foot. $6,600," as it cannot be inferred that the cinders are included in such item. Under a franchise ordinance, providing a railway company shall pave a certain number of feet of the street, it is not liable for the cost of a culvert under such part of the street, provided for by an improvement ordinance.—Supreme Court of Illinois, 104 N. E. R.

Street Railways—Condemnation of Franchise.

State ex rel. Peabody v. Superior Court for Kings County et al.—Rem. & Bal. Code, providing that any incorporated city may condemn and purchase or lease street railways within its limits, and control the use and operation thereof, and regulate and control the fares to be charged thereon, authorizes the condemnation of railways in active operation together with their franchises.—Supreme Court of Washington, 138 P. R., 277.

Treasurer's Funds—Discretion as to Depository.

Babcock et al. v. City of Rocky Ford.—Under Rev. St. 1908, requiring a city treasurer to keep all money in such place of deposit as may be designated by ordinance, the word "may" is not equivalent to "must" or "shall," and the city council may elect whether it will designate a depositary for the treasurer, and thus take the risk of relieving him from liability in case the depositary should fail, or hold him as an insurer, and decline to make such designation; the mere fact that the city, at the time the treasurer was chosen and thereafter, had large sums deposited in a certain bank in the form of special interest-bearing deposits not amounting to a designation of such bank as a depositary for city funds requiring the treasurer to deposit all other funds there.—Court of Appeals of Colorado, 137 P. R. 899.

Road Contractor—Debt—Jurisdiction of U. S. Court.

J. I. Case Threshing Mach. Co. v. Road Improvement Dist. No. 3 of Pulaski County, Ark.—A contractor for the building of a road under a contract with defendant, which provided that 10 per cent. of the contract price should be retained until completion and acceptance of the work, assigned the sum so retained to a creditor to whom the contractor was indebted in an amount exceeding such 10 per cent. Defendant in writing consented to such assignment, and agreed to pay the assignee such part of the 10 per cent. so retained as might be due upon final settlement with the contractor after the completion of the work up to the amount due to the assignee from the contractor. Held that, in determining the jurisdiction of a United States court over an action by the assignee against defendant on the ground of diverse citizenship, the citizenship of the contractor was immaterial, and the complaint was not demurrable for failure to allege that she was a citizen of a state other than that of the defendant, since the action was not upon an assigned chose in action, but was on a novation by which defendant was exonerated from liability to the contractor and became directly liable to the assignee.—United States District Court, 210 F. R. 366.

Street Car Licenses—Ordinances.

City of Chicago v. Chicago & O. P. E. R. Co.—An ordinance enacted Nov. 24, 1890, gave an elevated railroad company permission to construct a railroad on the streets named and provided that the company should pay an annual license fee of $50 for each car used in transporting passengers, and an ordinance of Dec. 19, 1892, approved the transfer by the company of the rights under the prior ordinances, and an ordinance enacted Oct. 1, 1894, provided that the company should pay an annual license fee of $50 for each car in regular use for transporting passengers which should be in lieu of all other licenses imposed, as regards the line of road hereby authorized, and that "the line of road heretofore authorized to be built" under the ordinances of Dec. 19, 1892, and Nov. 24, 1890, was thereby approved as complying with the ordinances. Held, that the company was bound to pay license fees imposed by the ordinances of 1890 and 1892, so long as it operated cars on the roads constructed under those ordinances, though the cars also ran on a road built under an ordinance providing for a different license fee, but that, if a line constructed under the ordinance of 1894, is operated as an independent line, the company will only be required to pay an annual license fee of $50 on each car in regular use on that line.—Supreme Court of Illinois, 104 N. E. R., 240.

NEWS OF THE SOCIETIES

Calendar of Meetings.

April 4-11.
EFFICIENCY SOCIETY, INC.—First National Efficiency Exposition and Congress, Grand Central Palace, New York City. W. H. Tallis, exposition director, 41 Park Row, New York City.

APRIL 7-8.
MAINE ROADS CONVENTION—First Congress, under auspices of the State Grange and the Maine Automobile Association, Bangor. For information apply to Bangor Chamber of Commerce.

April 16-17.
TRI-STATE WATER AND LIGHT ASSOCIATION.—Annual Convention, Atlanta, Ga. F. C. Wyse, assistant secretary, Columbia, S. C.

April 23-24.
VIRGINIA PUBLIC HEALTH ASSOCIATION.—Annual meeting, University of Virginia, Charlottesville. Dr. M. G. Perrow, Lynchburg, Va., president.

MAY 5-7.
NATIONAL FIRE PROTECTION ASSOCIATION.—Annual Meeting, Chicago, Ill. F. H. Wentworth, Secretary, 87 Milk street, Boston, Mass.

April 9-10.
FLORIDA STATE GOOD ROADS ASSOCIATION.—Annual meeting, Gainesville. A. B. Dunning, Secretary, Jacksonville.

May 11-15.
AMERICAN WATER WORKS ASSOCIATION.—Thirty-fourth Annual Meeting, Philadelphia, Pa. J. M. Diven, secretary, 47 State street, Troy, N. Y.

May 12-14.
AMERICAN ASSOCIATION FOR THE PROMOTION OF HYGIENE AND PUBLIC BATHS.—Annual Convention, Newark, N. J.

May 14-15.
NORTH CAROLINA ASSOCIATION OF MAYORS.—Annual convention, Charlotte.

May 18-23.
FIRST CANADIAN AND INTERNATIONAL GOOD ROADS CONGRESS.—The Arena, Montreal, P. Q. G. A. McNamee, General Secretary, New Beiks Buildings, Montreal.

May 20-30.
ELECTRICAL LEAGUE OF CLEVELAND, O.—Exposition, Coliseum, Cleveland, O. W. G. Rose, Manager, Illuminating Building, Cleveland.

May 26-28.
CITY MARSHALS AND CHIEFS OF POLICE ASSOCIATION OF TEXAS.—Twentieth Annual Convention, San Antonio. C. W. Newby, Secretary, Fort Worth.

June 1-3.
NATIONAL CONFERENCE ON CITY PLANNING.—Annual Meeting, Toronto, Canada. Flavel Shurtleff, Secretary, 19 Congress street, Boston, Mass.

June 3-5.
CONFERENCE OF MAYORS AND OTHER CITY OFFICIALS OF THE STATE OF NEW YORK.—Fifth Annual Conference Auburn, N. Y. W. P. Capes, Secretary, 105 East 22d street, New York City.

June 1-5.
NATIONAL ELECTRIC LIGHT ASSOCIATION.—Thirty-seventh Convention, Bellevue-Stratford Hotel, Philadelphia, Pa. T. C. Martin, Secretary, 29 West 39th street, New York City.

June 30-July 4.
AMERICAN SOCIETY FOR TESTING MATERIALS.—Seventeenth Annual Meeting, Hotel Traymore, Atlantic City, N. J. Edgar Marburg, Secretary, University of Pennsylvania, Philadelphia, Pa.

October 20-23.
INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS.—Annual Convention, New Orleans, La. James J. McFalls, Secretary, Roanoke, Va.

Northwestern Michigan Highway Officials.

The fifth annual road institute was held at Traverse City, March 24-25. The meeting was called to order by County Road Commissioner Frank Hamilton, of Grand Traverse county. Among the addresses made were the following: Relation of State Highway Department to Counties and Townships, by Frank F. Rogers; Financing Roads, by Frank Hamilton; Contract vs. Day Labor, by R. M. Hoffman; Highway Work in Philippine Islands, by L. H. Neilson; Wexford's Contribution for Roads, by D. B. Kelley, president Wexford Roads Association; Repair and Maintenance, by Frank F. Rogers, state highway commissioner; Southwestern Michigan Roads' Use of County Convicts, by W. M. Bryant, road commissioner of Kalamazoo county; Economy in Road and Bridge Construction, by L. H. Neilson, district engineer, State Highway Department.

Bristol-to-Norfolk Highway Association.

The Bristol-to-Norfolk Highway Association was formed in a meeting at Lynchburg, Va., March 24, in which sixteen counties were represented, the object of which is to work for an east to west modern road crossing the state. It was pointed out that practically the entire route is under contract or contemplated, excepting between Roanoke and Farmville.

The officers chosen were: President, Henry Roberts, of Bedford county; secretary-treasurer, W. T. Corwith, Lynchburg; vice-presidents: Washington county, A. J. Huff; Smyth county, John P. Buchanan; Wythe, E. Lee Trinkle; Pulaski, H. L. Trolinger; Montgomery, Dr. S. W. Fletcher; Radford, Judge George E. Cassell; Roanoke, J. A. Turner; Roanoke City, J. H. Marsteller; Campbell, John T. McKinney; Lynchburg, Ernest Williams; Appomattox, S. L. Ferguson; Prince Edward, J. L. Hart; Nottoway, Joseph M. Hunt; Dinwiddie, E. S. Hubb; Norfolk county and Norfolk, C. P. Shaw. Other eastern counties will have vice-presidents selected later.

Among the speakers and topics discussed were the following: Road Improvement in Virginia, by S. P. Coleman, of the State Highway Commission; Road Building in Campbell County, John T. McKinney, Lynchburg; The Good Roads of Amherst County, O. L. Evans, Amherst Court House; Value of Good Roads to Campbell County, by E. W. Hicks, Evington; Bristol-to-Norfolk Highway, by Henry Roberts, president Board of Trade, Bristol; Gravel and Soil Roads, by C. B. Scott, of the State Highway Commission; The Split Log Drag, by Eugene Ould, Evington; Good Roads and How They Are Built, illustrated by stereopticon, by M. E. Eldridge, U. S. Office of Roads; Good Roads of North Carolina, by H. B. Varner, Lexington, N. C.

California State Highway Convention.

A two days' conference of division engineers was held at Sacramento, March 26-27. At the conclusion of the first day's session those in attendance were the guests of Highway Engineer Austin B. Fletcher.

The program carried out was as follows:

March 26.

Opening address, Charles D. Blaney, chairman of the Highway Commission.

Civil Service as It Affects the Employees of the Commission, Charles C. Carleton and W. Lewis Clark.

Accounting, J. H. Small and Thomas E. Stanton, Jr.

Purchasing, Harry Warren and Geo. Mattis.

Surveys and Drafting, T. A. Bedford, Spencer V. Cortelyou, Fred W. Hazelwood, Samuel S. Stahl.

Testing of Minerals, Clarence Osborne and J. A. Woodson.

County Bridges, Walter C. Howe and E. Dodge.

Rights of Way, C. C. Carleton and George Harrison.

Day Labor vs. Contracts, William S. Caruthers and F. G. Somner.

Publicity, George B. Harrison and W. R. Ellis.

March 27.

Drainage, A. E. Loder and W. Lewis Clark.

Mountain Roads, F. G. Somner and T. A. Bedford.

Inspection on Contract Work—How May Its Cost Be Lowered, Lester Gibson and A. E. Loder.

Extra Work Orders and Permits, George R. Winslow and William S. Caruthers.

Concrete Bases, J. B. Woodson and Lester H. Gibson.

Thin Bituminous Tops, W. Lewis Clark and J. B. Woodson.

Asphaltic Concrete, A. E. Loder and Walter C. Howe.

Cost Data, A. B. Cleaveland and Robert K. West.

Maintenance, J. B. Woodson and A. E. Loder.

Southwestern Michigan Highway Officials.

The first meeting, which it is intended to make annual, was held at Kalamazoo, March 26-27. Among those who spoke and the topics discussed were the following: County Road Engineering, by H. C. Fleming, county highway engineer, Kalamazoo; Relation of State Highway Department to Counties and Townships, by State Highway Commissioner Frank F. Rogers; Contract vs. Day Labor, by Frank Mahrle, road commissioner, Calhoun county; Digest State Reward Specifications, by Wm. W. Cox, district engineer, State Highway Department; Trunk Lines, How Established, Constructed and Rewarded, by Leroy C. Smith; Repair and Maintenance, by Frank F. Rogers; Northwest Michigan Roads, county commissioner, Grand Traverse county; Economy in Road Construction, by Wm. W. Cox, district engineer, State Highway Department.

New Hampshire Road Convention.

The New Hampshire road convention closed at Concord, March 20 with an address by S. Percy Hooker, state superintendent of highways, who reviewed the addresses which had been given by the preceding speakers.

He made a careful survey of the various points which had been made and laid emphasis on those which were applicable to this state. This concluded the program of the greatest convention in the interest of better highways which had ever been held in this section of New England. It was

largely attended and the greatest interest was displayed by all of the delegates who attended from all parts of the state.

The session Friday was opened by an address by Charles W. Gates, state highway commissioner of Vermont, who told of the methods employed in the Green Mountain state. Paul D. Sargent, chief engineer of the state highway commission of Maine, had for his subject, "How to Get Large Results From a Small Expenditure of Money."

"Special Problems in the New England States" was the topic of the address by D. H. Winslow, representative of the United States department of public roads. Mr. Winslow for the past year has been in Vermont, and the similarity of that state with this caused his talk to be of intense interest. Horace E. Osgood, of the Osgood Construction Company, of Nashua, spoke on "Concrete Construction."

Arkansas Engineering Society.

The third annual meeting of the society was opened in the convention parlors of the Jefferson Hotel at Pine Bluff, at 10 a. m., March 16th. The Board of Directors immediately went into session and the other members were taken in automobiles for a trip over the City and to view the courses and grounds in the new park and parkway system, on which work will soon begin. At 12 o'clock they reassembled at the headquarters and all members, together with a number of business men of the city, were taken in automobiles to the construction camp for the new Dolarway pavement which is being constructed from Pine Bluff to the Jefferson-Saline county line, where luncheon was served by the contractors.

At 1:30 the meeting was formally opened by an address of welcome by the mayor of Pine Bluff, and response by the first vice-president. The following papers were then read and discussed: Sewage Disposal for Small Cities, by Theo. Hartman, of Little Rock; Water Works Design and Practice for Small Cities, by W. D. Dickinson, of Little Rock; Verticle Fibre Brick Pavements, by L. K. Parmalee, of Helena; Wood Block Pavements, by D. A. McCrae, of Little Rock; Bond Issues for Public Improvements, by F. R. Allen, of Pine Bluff.

At 8 p. m. a public session was held at the high school auditorium and an illustrated lecture on "The Panama Canal," by Prof. J. J. Knoch, Dean of the Engineering Department of the State University, and an illustrated lecture on "Concrete Highway Construction," by J. B. Marcellus, of Philadelphia, Pa., were given.

The morning session of the 17th opened at 8:30 a. m. and the following papers were read and discussed:

Fourche Drainage District, by A. M. Lund, of Little Rock; Earth Road Construction and Maintainance, by E. A. Kingsley, of Little Rock; the Dolarway Pavement from Pine Bluff to the Jefferson-Saline County Line, by J. T. Watson, of Pine Bluff; The Arkansas Highway Commission, by H. R. Carter, of Little Rock; Advancement in Engineering Education, by Prof. J. J. Knoch, of Fayetteville.

At 1:30 p. m. the election of officers was taken up and P. B. Hill was elected president; H. R. Carter, vice-president; W. J. Parkes, secretary-treasurer; and W. D. Dickinson and L. K. Parmalee new members of the Board of Directors.

The Board of Directors submitted the approved applications of eight men for membership and they were elected.

At 2:30 the members were taken on the steamer "Ethel" to the site of the new bridge over the Arkansas River, where they were taken over the camp and works, and refreshments were served by the contractors. L. L. Hardiman accompanied the party as the representative for the bridge company. The return was made about 6:30 and at 8:30 a banquet was served at the Hotel Jefferson, which marked the end of the meeting.

A few words about some of the features referred to might be of general interest. First, the Dolarway pavement which extends from Pine Bluff to the Jefferson-Saline County line, 23½ miues. This is the first paved country highway in the state and will constitute a section of the Pine Bluff-Little Rock highway. It is of especial interest to Arkansas engineers by reason of the varying types of soils over which it passes, as some of it is very low and some over moderately high territory; and as the general drainage of the whole territory is not very good. This road is constructed of a five inch concrete base with a Dolarway wearing surface, and had three foot shoulders of rock on each side, making the total width fifteen feet.

Second, the plan of a park and parkway system for Pine Bluff which includes the development of a sixty acre park and the construction of about ten and one-half miles of new pavements. The park will be accessable from all the paved streets and every country highway will have a pavement connection at the city limits. The park is a naturally beautiful plot of rolling ground and has a natural lake of about 12 acres which can readily be beautified at a moderate cost.

Third, the new bridge over the Arkansas River, above the city about four miles. This is a combination highway and railroad bridge, having double tracks in the center and roadways at each side. The bridge proper is 1,700 feet long in seven spans; one span of 750 feet being a lift span over the main channel of the river. The east approach is on high ground, but the west is very low and 1,300 feet is carried over on pile foundation.

Pier No. 1, has just been completed and sealed up at a depth of 84 feet below the bed of the river, and the work on No. 3 has just been begun. Members of the society were taken out to the barges at No. 3 and all who desired were permitted to enter the air locks and have the pressure run up to their satisfaction. One of the wost noteworthy and interesting features was a concreting barge designed by F. E. Washburn, the engineer in charge, and built under his direction. It carries a distribution tower and and engine which operates the mixer and elevator, on the forward end. The tower is fifty feet in height and the elevator has a capacity of ¾ cu. yd. Practically in the center of the barge is the mixer and over it is a storage bin for rock, which holds about 60 cu. yds. and a water tank which holds 60 cu. ft. On the stern is a hoisting engine, mast and boom, which handles a clam-shell bucket used for unloading rock from the barges to the storage bin. This engine also operates a pump which supplies water for the mixer. The main feature about the barge is in the manner of placement and distribution of weight, which is so perfect that when the machinery is all in operation and the boom swinging out with loaded bucket, the tilting of the barge is scarcely noticeable, and when the machinery is at rest the barge floats on an even keel.

All-Southern Transcontinental Highway Association.

Secretary John B. Kent, of the Lake Charles, La., Chamber of Commerce, has completed the program for the meeting to be held at Lake Charles, April 7-8.

The first session will be held at 8 o'clock on the evening of April 7. Governor L. E. Hall, of Louisiana, will preside and will deliver the opening address. A welcome will be extended the delegates by Mayor G. L. Riding on behalf of the city and by Dr. S. M. Lyons on behalf of the Police Jury. The response will be made by former Governor J. Y. Sanders. D. E. Clop, secretary of the highway division of the San Antonio Chamber of Commerce, will deliver an address upon The Value of an All-Southern Highway. Railways and Highways will be the topic of H. M. Mayo, of Houston, who has charge of the immigration department of the Sunset Central line. At this session, committees will also be appointed.

April 8, at 9.30 a. m., M. Gulteman, of Beaumont, will preside. The following addresses will be delivered: Road Construction Under the State Highway Department, by W. F. Atkinson, state highway engineer of Louisiana; Highway Construction in Calcasieu, by C. H. Sweetser, parish highway commissioner; Good Roads Everywhere, by Homer D. Wade, of Standford, Tex., secretary of the Texas Good Roads Association. Three minute talks by delegates will conclude this session.

At 8 o'clock p. m. Dr. N. P. Moss, president of the Southwestern Louisiana Development Bureau, will act as chairman. J. B. Babb, secretary of the Chamber of Commerce of Shreveport, will talk on the Lake Charles, Shreveport and Dallas Highway. E. E. Thowbridge, of Kansas City, will speak on Modern Road Building; and J. T. Bullen, senior engineer of the Federal Department of Public Roads, will talk on Gravel Roads. The reports of the committees will wind up the session.

Illinois Association of Municipal Contractors.

At a recent meeting in Chicago the following officers were elected: Perry Fletcher, president; J. A. Meyers, East St. Louis, P. H. Tiernan, McComb, T. W. Keys, LaSalle, and A. W. Eisenmayer, Granite City, vice-presidents; Joseph Gund, secretary and treasurer; C. E. Matier, Chicago, executive secretary.

Tri-State Water and Light Association.

The following questions have been submitted by members for discussion at the meeting to be held in Atlanta, April 16-17:

What are the advantages of a three-wire, 220-volt, over a two-wire, 110-volt lighting circuit?

Will a polyphase 10-volt meter on a three-phase power circuit of same voltage register correctly the current consumed in single-phase lighting taken from the same circuit?

Do you use and recommend genuine wrought iron pipe or wrought steel pipe for water service? (b) What is your experience with the non-rusting qualities of wrought iron pipe?

What is a good practical test to determine wrought iron from steel pipe?

How often should the lightning arresters be inspected?

How do you convince an irate customer that his meter is more apt to cheat you than him (electric and water)?

How may the usefulness of this association be advanced?

How do you guarantee payment of bills? (a) Do you require cash deposits from all consumers or is discrimination made? (b) In first adopting a cash deposit system do you require old customers to make deposits? (c) Do you pay interest on cash deposits? (d) Do you install prepay meters (electric) without cash deposits?

Is there any saving in maintenance and operation of power-driven trench pumps in laying mains and making repairs?

Should non-paying water consumers be metered, that is, free public supplies, such as city buildings, schools, fountains, etc.?

What is your experience with leadite for water pipe joints? (a) Is it reliable? (b) Is it economical?

Is it advisable for the meter reader to leave a slip each month showing the consumer the quantity used? Does it lessen kicks?

In case of a large waste of water through poor plumbing, what has been found the most satisfactory way of adjusting the bill?

Information is wanted on commercial rates for light and power in the various cities.

What flat rate do you charge for residences not metered? (a) Do you charge for each separate opening? If so, how much for each size and purpose for which it is used? (b) Do you charge for the size of the service pipe above without regard for the number of openings thereon?

What system of inspection do you use to prohibit the wilful waste of water on flat-rate services?

What kind of drinking fountains for man do you find most serviceable for street use?

What means can be employed to prevent condensation on under side of meter glasses?

Merchants' Association of Burlington, Vermont.

At a meeting, March 19, State Highway Commissioner Charles W. Gates made an address explaining the Vermont system of caring for roads—work done by townships with state aid in proportion to the township appropriation. Mr. Gates said that the system was cautious and economical. He also told of the new patrol system by which if the town pays a certain proportion of the expense the state may put a man on a section of road and keep him there to look after it.

The meeting was held in the evening following a conference of the road commissioners of Chittenden county with the state highway commissioner.

Road Commissioners of Georgia.

The road commissioners of the state will meet at the New Kimball, April 15-16, for the purpose of forming a permanent association looking toward the betterment of general road conditions.

Some of the questions to be discussed as already decided upon are legislation as it affects the various county matters, government aid in the building and maintenance of public roads, a state highway commission and the handling and care of convicts.

Supervisors of Somerset County, Pa.

An organization was formed at a meeting, Somerset, March 17, with the following officers: President, C. A. Will, of Milford Township; vice-presidents, S. G. Coughenour, of Allegheny Township, and J. B. Colborn, of Lower Turkeyfoot Township; secretary, Charles F. King, of Middlecreek Township, and treasurer, Peter Hoffman, of Paint Township. Road work was the principal topic discussed.

Clearfield Township Highway Supervisors' Association.

This association was formed under the new state law, at Clearfield, March 20, with the following officers: President, M. I. McCreight, DuBois; first vice-president, E. E. Murray, Goshen township; second vice-president, Calvin Bilger, Bloom township; secretary, H. B. Swoope, Bigler township; treasurer, Ed. Cowan, Lawrence township.

North Carolina Association of Mayors.

At the annual convention, Charlotte, May 14-15, an interesting feature will be the display of pictures descriptive of the towns represented by the officials. The views will be placed in the council chamber of the city hall. There will be a parade in which the police and fire departments will take part.

Florida State Good Roads Association.

Secretary A. B. Dunning, Jacksonville, has issued a circular regarding the annual meeting to be held in Gainesville, April 9-10. Road legislation providing for a state highway commission will be discussed. Samples of road materials will be exhibited.

PERSONALS

Carr, O. E., Cincinnati, O., for two years engineer in charge of the underground survey at Cincinnati, has been appointed city manager of Cadillac, Mich.

Hill, Nicholas S., Jr., consulting engineer, 100 William street, New York City, begs to announce that Mr. George A. Taber, member American Society Civil Engineers and Consulting Professor of Water Supply and Sewage Disposal in the Polytechnic Institute of Brooklyn, has become a member of the engineering staff of this office.

Mr. Taber has for over twelve years been connected with the water supply of the City of New York as assistant to the Chief Engineer of the Water Department, Assistant Engineer in charge of the main office of the Aqueduct Commission; Assistant Engineer in charge of the designing division in the Water Department of the Borough of Brooklyn, and Assistant Engineer in charge of the construction and extensions and additions to the distribution systems in the Boroughs of Manhattan, the Bronx and Richmond.

The following chief executives have been elected in New York state:

Lestershire—Frank M. Duryea, re-elected mayor.

Union—Willard Dunham, re-elected president.

Endicott—George Nichols, president.

Whitney Point—Frank Perry, president.

Port Dickinson—Henry L. Harriss, president.

Ballston Spa—David Lewis, president.

Oakfield—George W. Halton, president.

Corinth—J. Finley Work, president.

Groton—Stephen H. Clapp, president.

Addison—William F. Latterman, president.

Arcade—Frank W. Briggs, president.

Hammondsport—Dr. F. P. Green, mayor.

East Aurora—Alfred Brotherhood, president.

Lyons Falls—Lawrence Hoffman, president.

Tarrytown—Frank R. Pierson, president.

Hastings-on-Hudson — Thomas F. Reynolds, president.

Tuckahoe—Henry F. Fulling, president.

Herkimer—Dr. E. G. Kern, president.

Hamilton—Sidney D. Smith, president.

Nelliston—Robert E. Wick, president.

Oriskany Falls—James A. Douglas, president.

Lowville—W. J. Stoddard, president.

Clayville—B. T. Babbitt, president.

Boonville—Peter Rauscher, president.

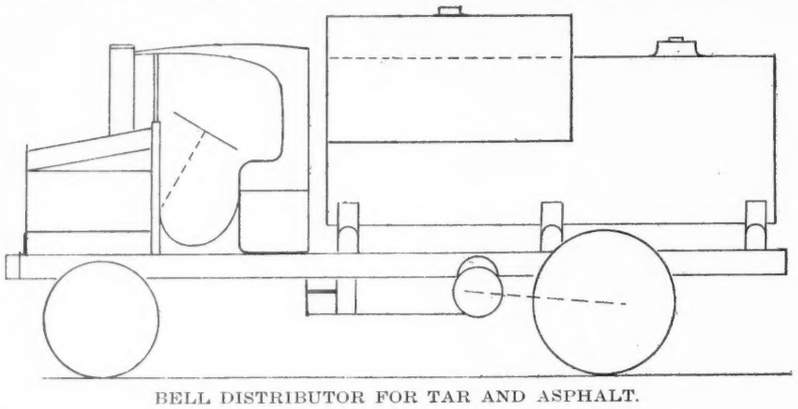
Newport—V. H. Harris, president.

NEW APPLIANCES

BELL DISTRIBUTOR.

Steam-Propelled Truck Pumps, Heats and Distributes Asphalt and Tar.

The Bell Locomotive Works, Inc., Yonkers, N. Y., have designed and will soon place on the market a novel distributor for road bitumens. The essential novelty of the machine consists in the fact that the automobile is steam-propelled. This feature makes available steam for heating the bitumens in the tank car, pumping from tank cars to the truck tank, heating the tar while hauling to the job and expelling



BELL DISTRIBUTOR FOR TAR AND ASPHALT.

under steam or air pressure at the job.

In designing this chassis it has been the aim to produce a heavy service, oil-burning, steam motor truck or tractor. The intention has been to hold strictly to the principals and design of other heavy service trucks in everything except power plant, with the result that axles, frame, etc., are of practically the same design and construction as any other standard motor truck and the unconventionality is confined entirely to our power plant, and this is only unconventional from the motor truck standpoint, as the steam plant is practically the standard the world over for other heavy service work.

Following specifications apply to he shortest chassis which is intended for tractor service.

FRAME. The frame is 172 inches over all in length, 34½ inches wide and contains 5 cross members strongly secured to the side channels. In addition there are several light cross angles and channels which are used in supporting the boiler, etc. The two main side members and five cross members are of 7-inch channel weighing 11.75 pounds to the foot. All joints are made up with heavy angles and plates.

Axles. Jack-shafts and distance rods, etc., are made by the Timken-Detroit Axle Company.

Wheels. All wheels are of the artillery type, second growth, grade A hickory. The front wheels contain 12 spokes 2½ inches wide, and the rear wheels 14 spokes 3½ inches wide.

Springs. The material is vanadium, heat-treated. The front springs measure 40 inches long by 2½ inches wide and contain 8 leaves. The rear springs measure 50 inches long by 4 inches wide and contain 15 leaves.

Steering Gear. We use a Ross steering gear, with 22-inch wheel. The post sets at an angle of 60 degrees and is firmly supported by a strong steel casting.

Engine. The engine is of the regular locomotive type commonly seen on steam shovels and steam road rollers. It lays forward of the jack-shaft to which it is directly connected by means of spur gears. The engine cranks, etc., run in oil. Its location affords easy access and keeps it well above all mud and dust.

Boiler. The boiler is of the fire tube type, and is operated under 250 pounds pressure. The shell is of pressed steel wire wound and the tubes are of copper bushed at both ends with steel. The heating surface obtained is 156 sq. ft.

Fire-Box. The fire-box is made of sheet iron with all joints riveted. It is 8 inches deep and 26 inches in diameter. The sides and bottom are lined with good grade of fire-brick. It is firmly mounted, but may be renewed readily, though this is seldom necessary owing to there being no super-heaters under the boiler to burn out and require replacement.

Burner. A patented atomizing type of oil burner is used. The oil flows to it by gravity and in a cold state, it is then atomized and forced into the fire box by a single small steam jet.

Water System. The water is supplied to the boiler when the truck is in motion by a single pump direct connected to the engine, and controlled by a by-pass valve. When standing water may be supplied to the boiler by an injector. We have found that one pump and one injector make the best water supply arrangement.

Lubricator. The lubricator is of the condensing type with no moving parts. It is mounted on the dash.

Fuel Tank. The fuel tank is located under the driver's seat.

Cab. A wood cab is furnished. The dash and other similar parts are of metal.

Tires. Solid rubber truck tires are used; 34x5-inch single front; 42x6-inch dual rear.

Control. The truck is controlled by a throttle lever located on the steering post, a double foot brake and a double emergency brake, also the reverse may be used as a brake. The reverse lever is mounted on the dash in easy reach of the driver.

ALL-ASPHALT EXPANSION JOINT.

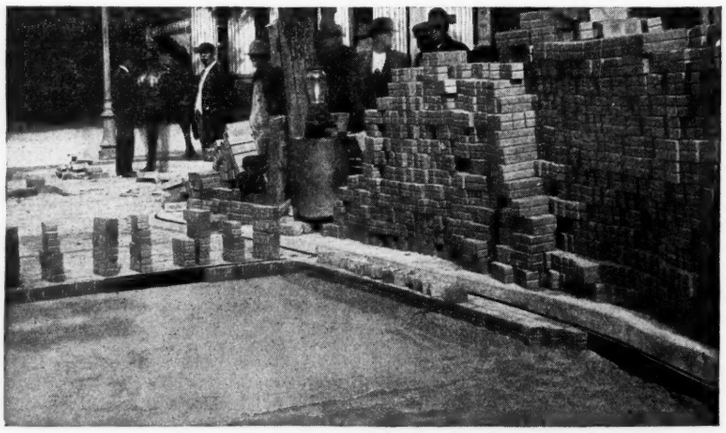
To meet the increasing demand for a prepared expansion joint for brick, concrete and wood-block pavements, the Barber Asphalt Paving Company has just put on the market a joint known as the "Genasco Asphalt Expansion Joint," the entire thickness of which is asphalt. In other words, this joint differs from some others in that it has no felt nor other reenforcement. The pliability of the material of which the joint is made makes the strips resemble rubber, and in 5-ft. lengths they are easily handled at ordinary temperatures. The joints are made in any required depth and thickness. The illustration herewith shows in a graphic way the time and labor-saving advantages of a prepared joint as compared with the difficulties incidental to pouring joints.

STAMPED METAL GOODS.

Street Name Signs—House Numbers—Automobile Tags—License Tax Plates.

The Niagara Falls Metal Stamping Works, Niagara Falls, N. Y., make many hardware specialties for municipalities. These include name signs, house numbers, automobile numbers, bicycle tags, dog tax tags, vehicle license plates, police and miscellaneous badges.

Of the very large variety of manu-



USING GENASCO ASPHALT EXPANSION JOINTS.

factures of this company a few are selected for illustration and description.

Street signs and house numbers, as shown in the illustration, are made of sheet metal, steel bars and aluminum. The letters and figures are broad faced and embossed up. For durability, good looks and continuous legibility, these signs and numbers are very superior. A wide variety of choices is afforded as regards finishes. For instance, the background may be plain aluminum, with letters of any color. The background may be brass and colored letters used. Enamels may also be used as the background and colored letters.

For street signs, plain aluminum is the best. They are made of aluminum guaranteed 99 per cent. pure. Aluminum, of course, does not tarnish, rust or corrode. The names show up well with a background of enamel.

Sheet steel signs are finished on both sides with bicycle enamel, any color desired, and the letters and borders are finished in different colored enamel.

Brass signs are lacquered to prevent tarnish. They may be either oxidized with letters and borders polished, or polished brass, with letters and borders enameled black.

The illustration also shows, besides tags, separate embossed letters and figures which are made in five sizes, varying from one to four inches in height. The three inch figures are largely used as house numbers. The three and four inch make attractive street name signs, when properly mounted on a suitable background. They are plain, do not hold dust or dirt, are broad faced and distinctly legible at a considerable distance.

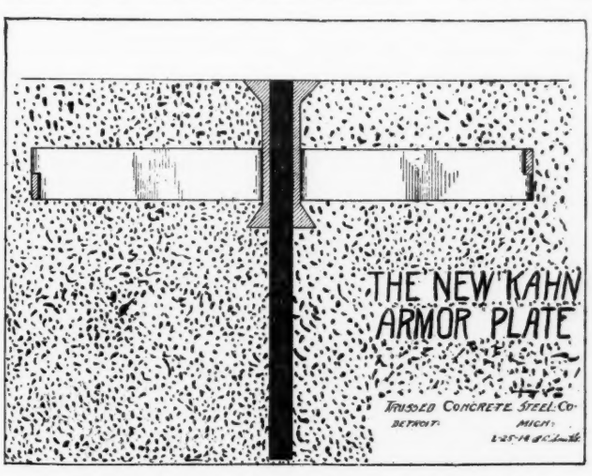
The license tags shown on the same illustration may be made of brass or aluminum. Many varieties of shapes are made. If the shape is changed yearly, it is possible to see at a glance, that the license is for the current year.

KAHN ARMOR PLATE.

New Design for Protecting Joints of Concrete Roads.

The Trussed Concrete Steel Company, Detroit, Mich., have placed on the market a new type of armor plate. It is to embody the good features of the old style plate, as regards lengths, crowning, etc., and is manufactured from special dead soft steel. The head at the top is ⅜ inch wide and the plate 2½ inches deep, with shear members 6 inches long. The flange at the bottom of the plate is for the purpose of rolling to better advantage and convenience in shipping. It makes a uniform channel section and gives a better anchorage to the slab.

A new installing device is used with this plate. It is a T bar, made of varying lengths to suit the street. For unusually wide streets, the bar is made in two lengths, folding at the middle. The clamps on this bar are 6 inches from each end and 24 inches center to center throughout the length of the bar and operate with a combined motion which tends to clamp the plates together and at the same time draw them firmly up against the body of the T.



FOR PROTECTING JOINTS OF CONCRETE ROADS.

Avon Airless Tire.

The American Tire Company, Montello, Mass., has placed on the market a tire of entirely new construction, called the Avon Airless tire. In this tire it is claimed that creeping, internal friction and saturation have been overcome. It is a light weight, strong traction non-puncturable, non-skidding tire. It was invented by J. W. Clapp, as the result of years of patient and persistent efforts, who conceived the idea that a tire composed largely of wool felt would combine the good qualities of both the pneumatic and the solid tire, at the same time eleminating disadvantages of each.

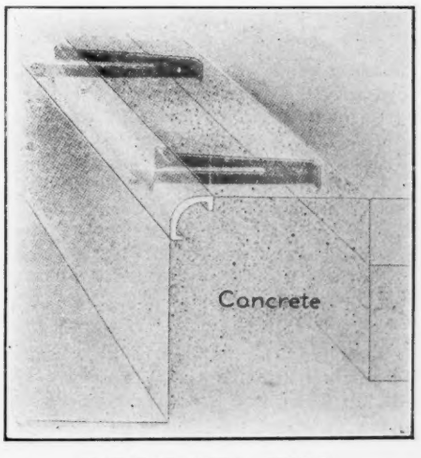
One experiment made on the tire gives an idea of its unusual physical properties. A tire was put in a hydraulic press and subjected to a pressure of forty tons. The 4½-inch tire was compressed to one inch. After the pressure was relieved, in a short space of time, the tire had regained its natural form.

CURB GUARD.

Clip-Bar Device Is Provided With New Anchoring Member.

The Clip-Bar Manufacturing Company, 2540 Olive street, Philadelphia, Pa., have made an improvement on their curb guard and concrete reinforcement. In passing, as showing the extended use of devices of this sort it may be mentioned that the Clip-Bar product has been used in about 140 cities and towns. The new feature is the anchor. The improved clip anchors are shown in the illustration. These have a double function—first, to position and support the guard in the form while the concrete is being installed, and, second, to anchor the curb guard securely in the concrete structure when finished. The slip anchors are sprung into the bars at intervals of nine inches, and after they are all in position the bars are placed in the forms, where they are held securely in the desired position by wedging the clip anchors tightly between the boards forming the face and back of the curb.

One of the particular advantages claimed for this bar is that the body of concrete in which the Clip-Bar is embedded is massed solidly behind and in contact with the guard, passing through and filling the slots in the clip anchors as well as the space between the flanges of the bar. It will be noted that the bar forms a square edge at the joint with the concrete. It is claimed that the bar admits of being bent readily to a true radius.



CLIP-BAR CURB GUARD.

INDUSTRIAL NEWS

Cast Iron Pipe—Chicago. The American Car and Foundry Company was low bidder at Detroit for 10,000 tons of pipe. Quotations: 4-inch, $26; 6 to 12-inch, $24; 16-inch and up, $23.50. Birmingham. Demand for soil pipe is active. No change is noted in the water pipe situation. Quotations: 4-inch, $21; 6-inch and up, $19. New York. Private buying has picked up considerably and the past week developed a considerable volume of business of this character. Competition for large orders is sharp. Quotations: 6-inch, car loads, $22 to $23.

Lead.—Market is dull. Quotations: New York, 4c, St. Louis, 3.875c.

Paving Brick.—The following are quoted prices per square yard and per thousand for paving brick delivered in a number of cities in New York State.

	Per Sq. Yd.	Per 1,000
Albany	$1.15	$28.75
Binghamton	1.00	25.00
Buffalo	.90	22.50
Hornell	92	23.00
Jamestown	90	22.50
Ogdensburg	1.27	31.75
Plattsburg	1.27	31.75
Rochester	.95	23.75
Syracuse	1.00	25.00
Utica	1.03	25.75
Watertown	1.17	29.25

Road Engine Tests.—A. B. Farquhar Company, Ltd., York, Pa., in their 1914 catalogue, publish the following figures of tests of single and double cylinder Farquhar engines:

20 h. p., Style K. Constant load maintained on brake during two hours' run, 65 h. p.; amount of water used, 4,750 lbs.; coal, 650 lbs.; water evaporated to each pound of coal, 7.03; maximum brake test after the two hours' run was 81 h. p.

15 h. p., Style K. Constant load maintained on the brake during two hours' run, 40 h. p.; water used, 3,353 lbs.; water evaporated to each pound of coal, 7.05; maximum brake test after two hours' run, 65 h. p.

Farquahar double cylinder road engine. Constant load maintained on brake during two hours' run, 75 h. p.; water used, 4,790; coal, 700 lbs.; water evaporated to each pound of coal, 6.84.

Farquahar double cylinder road engine. Constant load maintained on brake during two hours' run, 46 h. p.; water used, 3,593 lbs.; coal, 425 lbs.; water evaporated to each pound of coal, 8.45. Maximum brake test developed after two hours' run, 94 h. p. (This was not the full brake test rating of the engine, but all the belt used would carry.)

Garbage Incinerator.—The Harris Municipal Garbage Incinerator and Steam Generator Co., Nashville, Tenn., have received official notice that the patent claims for the Harris incinerator have been allowed. Mr. Harris now offers for sale the foreign rights for the invention.

Asphalt Paving Plant.—The F. D. Cummer & Son Company, Cleveland, O., have recently been awarded a contract by the city of Pittsburg for a Cummer stationary asphalt paving plant. The new plant will be located on the north side. It will be a large plant, having a guaranteed capacity of 2,500 square yards of completed pavement per day, consisting of 2-inch top and 1-inch binder. The design calls for double units with accessories of the latest kind intended to save labor wherever possible. There will be two Cummer dryers, two 15-foot mixers, elevators and appurtenances.

Mexican Oil—Richard Levering of Richmond, Levering & Co., who controls over 100,000 acres of oil lands in Mexico, on which several hundred active oil seepages have been found, is planning the development of the properties through the Adrion Oil Corporation, capitalized at $600,000, and to which he has turned over a large part of his acreage. Mr. Levering was active in developing the Indian Refining Co. from its inception to a place among the largest independent oil refineries.

Portable Asphalt Mixer.—The Rapid Mixer Co., Grand Rapids, Mich., have agreed to place one of their asphalt mixers at the disposal of the city of Syracuse, where a trial will be made of the system of repairing streets by city labor. Council will be asked to appropriate $800 for material to begin the preliminary work. The work will be done under the direction of City Engineer Wooley.

Consulting Engineers.—The announcement is made that Cornelius C. Vermeule now has associated with him Hubert K. Bishop, who was from 1909 to 1911 first deputy commissioner of highways of the state of New York and later superintendent of public works of the territory of Hawaii. They will continue at 203 Broadway, New York, the water supply, sanitary and hydraulic practice heretofore conducted by Mr. Vermeule, and will also give special attention to highways, pavements and sea coast protection.

Road Roller.—The commissioners of Wilson, Pa., have come to the conclusion that it is cheaper for them to own a road roller than hire one. They are looking at a roller made by the Good Roads Machinery Company, exhibited by R. C. Wood, of Philadelphia, which can be used for training up streets; also a roller made by the Galion Iron Works, represented by F. L. Hirsh.

Gas Engine.—The Snow Engine Co. has been given a contract by the city of Abbeville, La., for a 110-horsepower internal combustion engine to operate the local electric light and water works plant. The engine pump and accessories cost about $8,000.

GOODRICH ORGANIZATION.

W. O. Rutherford Appointed Assistant General Sales Manager.

The announcement that W. O. Rutherford has been made assistant general sales manager of the B. F. Goodrich Company is received with pleasure by everybody in the automobile world who knows Mr. Rutherford. He has time and again demonstrated his ability to meet and handle big situations in the selling field.

This change carries with it official recognition for the duties which have been performed by Mr. Rutherford during the past four years as assistant to H. E. Reynolds, second vice-president and general sales manager, and marks another step in an unusually successful career.

Perhaps the most conspicuous talent of Mr. Rutherford is that of organization. His associates in the industry testify to the fact that he has few peers in the capacity to enthuse a selling organization and keep it at a productive white heat.

Mr. Rutherford's grasp of selling methods was acquired first as manager of the Denver branch and then during a period of ten years' service at the head of the Buffalo organization of the B. F. Goodrich Company. During the past four years his headquarters have been at Akron.

"It is a most acceptable promotion," Mr. Rutherford says modestly, "and, like all promotions that mean anything, it means work. I don't believe any man can successfully fill a position without realizing that each step he takes means more and harder work for him. But with such a sales organization as the one which keeps Goodrich tires moving from the factory to the tire user in such a great volume as we have today, my position is not an unusually difficult one. Our 'safety first' campaign this winter has awakened motorists all over the country to the distinct advantage of the Goodrich safety tread in all weathers and all times of the year.

"The fact that the Goodrich company has always been the pioneer not only in developing the quality in the manufacture of the tires, but in lowering the prices to the user, also has its effect, naturally, in the work of the sales department. But on top of all that comes the quality of Goodrich tires and their continuously good service which is made possible only by their quality. After all, an established and increasing volume of sales means but one great thing—quality of product and service to the user. So you see it is not such a trying task, after all, to assist in directing the sales of something that people want because they know its value."

Paving Company.—National Pavement Company, of New York, has been incorporated. Capital stock, $850,000. To deal in and with materials for pavements, streets, roads, etc. Incorporators: A. J. Sherman, Philadelphia; L. A. Brownhill, M. E. Dorsey, Wilmington, Del.

ADVANCE CONTRACT NEWS

ADVANCED INFORMATION BIDS ASKED FOR

CONTRACTS AWARDED ITEMIZED PRICES

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
			STREETS AND ROADS	
Wash.	Tacoma	Apr. 4	Paving 4½ miles, cost $50,000; 6½ miles, $60,000	County Comrs.
N. D.	Crafton	6 p.m., Apr. 4	Constructing sidewalks and crossing for the year	J. H. Johnson, City Aud.
Iowa	Cresco	3 p.m., Apr. 4	24,000 sq. yds. cement paving, 15,500 ft. curbing	A. W. Gillet, City Clk.
Ky., Mt.	Sterling	2 p.m., Apr. 4	Improving post road	Co. Fiscal Court.
Man.	Ritchot	Apr. 4	Grading street	C. Gauthier, Sec.-Treas.
O.	East Youngstown	noon, Apr. 4	Furnishing material and constructing sidewalks for 1914.	C. N. Anderson, Vil. Clk.
O.	Athens	noon, Apr. 4	Grading, draining, curbing and paving with brick	B. Davidson, Dir. P. S.
O.	Troy	10 a.m., Apr. 4	Gravel road, 2½ miles	County Comrs.
Neb.	Meek	Apr. 4	Road grading	F. H. Griffith, Twn. Clk.
Miss.	Bay St. Louis	3.30 p.m., Apr. 4	Shell crusher with gasoline engine	R. F. O'Brien, Secy.
Ill.	Chicago	11 a.m., Apr. 6	One million gals. road oil	L. E. McGann, Comr. P. S.
O.	Steubenville	noon, Apr. 6	Grading, curbing and constructing sidewalk	J. P. Gavin, Dir. P. S.
Ind.	Jasper	2 p.m., Apr. 6	Furnishing and delivering 50 to 100 carloads crushed stone	J. H. Seng, Aud.
Idaho	Boise	Apr. 6	Repairing and improving public roads	Co. Comrs.
Miss.	Forest	11 a.m., Apr. 6	Grading, bridging, surfacing, 7 miles	Highway Comrs.
N. J.	Hackensack	8.15 p.m., Apr. 6	Laying 6-inch bluestone crosswalks for the year	C. Linkroum, Pres.
N. J.	Plainfield	8 p.m., Apr. 6	Asphalt tar and oil distributor; 2 gravel distributors; 70,000 gals. asphalt; 70,000 gals. refined tar, and 10,000 gals. non-asphaltic oil	J. T. McMurray, City Clk.
Ind.	Huntington	10 a.m., Apr. 6	Two stone roads	H. Guthrie, Aud.
Kans.	Lancaster	6 p.m., Apr. 6	Six concrete street crossings	City Council.
Wash.	Olympia	3 p.m., Apr. 6	Constructing about 8½ miles road	State Hwy. Board.
Wash.	Seattle	2 p.m., Apr. 6	Road construction	Co. Comrs.
Alta.	Banff	noon, Apr. 6	13,500 lineal feet, 20-inch diameter, steel pipe	Dept. Interior, Ottawa.
Minn.	LeSueur	2 p.m., Apr. 6	16 road drags, 24 wheel scrapers and 4 road plows	J. H. Kaisett, Co. Aud.
Iowa	Aimes	7.30 p.m., Apr. 6	Constructing and repairing sidewalks and crossings for the year	A. B. Maxwell, City Clk.
Miss.	Greenwood	Apr. 6	Improving 21.5 miles post road	A. R. Bew, Clerk.
Wash.	Ephrata	Apr. 6	Paving permanent highway; cost, $20,000	County Comrs.
Ind.	South Bend	11 a.m., Apr. 6	One 10-ton road roller and one 20-bbl. sprinkling wagon.	County Comrs.
Fla.	Orlanda	2 p.m., Apr. 6	Furnishing five million paving blocks	G. R. Ramsey, City Engr.
O.	**Ottawa**	**noon Apr. 6**	**Furnishing road machinery**	**County Auditor.**
Ind.	**Brownstown**	**2 p.m., Apr. 6**	**Roads in two townships**	**County Comrs.**
Ind.	Fowler	1 p.m., Apr. 6	Constructing various roads	Board Comrs.
Ind.	Hartford City	2 p.m., Apr. 6	Road construction	Co. Comrs.
Minn.	Minneapolis	11 a.m., Apr. 6	Grading and graveling	A. P. Erickson, Co. Aud.
Ind.	Franklin	2 p.m., Apr. 6	Improving gravel road; cost, $12,005	Co. Comrs.
Miss.	**Hattiesburg**	**Apr. 6**	**Furnishing material, grading, surfacing and bridging, about 9 miles**	**J. H. Denham, Sec. Hy. Comn.**
N. D.	Bowman	Apr. 6	Grading roads; two jobs	C. E. Lason, City Aud.
N. D.	Casselton	6 p.m., Apr. 6	Sidewalk construction for the year	C. W. Bernam, Co. Aud.
N. D.	Carrington	10 a.m Apr. 6	Road grading in various townships	E. R. Fairbanks, Aud.
O.	Urbana	noon, Apr. 6	Furnishing material, curbing and paving	J. W. Flaugher, Dir. P. S.
Ind.	Greencastle	2 p.m., Apr. 6	Constructing 8,481 ft. gravel road	County Comrs.
Ind.	Greensburg	1 p.m., Apr. 6	Grading, draining and paving	County Comrs.
O.	Madison	Apr. 6	Grading, paving, draining, 5 miles	County Comrs.
N. D.	Ellendale	Apr. 6	Constructing cement s'walks and crosswalks for the year.	J. King, City Aud.
Miss.	Forest	Apr. 6	Permanently improving 7 miles	W. A. Turner, Sec. Sup.
Miss.	Madison Station	Apr. 6	Improving about 14.5 miles road, gravel surface	W. E. Mann, Sec. Hwy. Comrs.
Ill.	Hillsboro	Apr. 6	17,565 sq. yds. paving on 5-in. cement base, curbs, gutters, sewers, etc	H. S. Hargrave, Comr. Fin.
Miss.	Boonville	Apr. 6	Improving about 3.6 miles road	Highway Comrs.
Mo.	Jefferson	6 p.m., Apr. 6	Cement curbing and guttering, grading and macadamizing	F. C. Harding, City Engr.
Ind.	Kokomo	Apr. 6	Six-foot cement sidewalk	B. Haven, City Clk.
N. Y.	Troy	Apr. 7	Paving; cost, $80,000	S. E. Roche, City Engr.
Pa.	Harrisburg	10 a.m., Apr. 7	Indeterminate quantity bituminous material	State Highway Dept.
Wash.	Port Angeles	Apr. 7	Grading, ditching, bridging 6.5 miles; clearing, grubbing, etc., 7.29 miles	County Comrs.
Wash.	Montesano	Apr. 7	Constructing road, cost $20,000	R. G. Trask Co., Aud.
Ark.	Paragould	Apr. 7	Paving about 60,000 sq. yds	Comrs. Paving Dist.
Ind.	Corydon	2 p.m., Apr. 7	8,265 sq. ft. cement walk	Board Co. Comrs.
Ia.	Anamosa	10 a.m., Apr. 7	Constructing country road	E. J. Hines, Co. Aud.
Ind.	Madison	1.30 p.m., Apr. 7	Grading, draining and paving	County Comrs.
Ind.	Sullivan	noon, Apr. 7	8,707 ft. stone and gravel road	County Comrs.
Ala.	Rockford	noon, Apr. 7	Grading, draining and surfacing; cost, $6,542	Board Co. Comrs.
O.	Jefferson	1 p.m., Apr. 7	Grading street	Board Co. Comrs.
S. D.	**Leola**	**8 p.m., Apr. 7**	**For Galvanized corrugated steel culverts**	**J. B. Whittmayer.**
Ind.	Kokomo	Apr. 7	Constructing gravel, brick and stone road in several townships	E. B. Swift, Co. Aud.
Ind.	**Winamac**	**Apr. 7**	**3 mile road; cost, $8,800**	**C. E. Paul, Co. Surveyor.**
Ala.	**Guntersville**	**noon Apr. 7**	**Grading and draining 25 miles road; paving 5 miles chert and gravel; also 4 miles macadam**	**T. D. Kemp, Co. Engineer.**
Ind.	Knox	noon, Apr. 7	Grading, draining, paving; two jobs	Board Co. Comrs.
Ind.	Princeton	10 a.m., Apr. 7	Grading, draining and paving with stone	Co. Comrs.
Minn.	Bemidji	2 p.m., Apr. 7	Constructing part of rural highway	J. L. George, Co. Aud.
Minn.	Brainerd	2 p.m., Apr. 7	130 H.P. tractor and 6 dump wagons	J. F. Smart, Co. Aud.
S. D.	Chamberlain	9 a.m., Apr. 7	Grading highways, about 20 miles	J. F. Maack, Co. Aud.
N. D.	Willston	8 p.m., Apr. 7	Cement sidewalks and crossings for the year	G. G. Harbey, City Aud.
O.	London	Apr. 7	2 miles grading and waterbound macadam	County Comrs.
S. C.	Charleston	7 p.m., Apr. 7	Furnishing brick, Portland cement, iron castings, concrete sidewalks, etc	J. H. Dingle, City Engr.
Fla.	Brooksville	noon, Apr. 7	Furnishing two million vit. paving brick	H. M. Snow, Clk.
Ind.	Lawrenceville	1 p.m., Apr. 7	Gravel and macadamized roads	E. W. Edwards, Aud.
Ind.	Shelby	10 a.m., Apr. 7	Road grader	F. W. Fagel, Co. Aud.
Mich.	Hancock	noon, Apr. 7	Constructing 3¼ miles road	R. Martin, Engr., Houghton.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Ind.,	Marion	2 p.m., Apr. 7.	Four roads	E. H. Kimball, Aud.
Wash.,	Austin	1 p.m., Apr. 7.	One mile crushed rock macadam	Co. Comrs.
Ind.,	English	2 p.m., Apr. 7.	Road construction	J. B. Enlow, Aud.
Ind.,	Vincennes	2 p.m., Apr. 7.	Road construction, gravel	J. T. Scott, Aud.
Ind.,	Logansport	10 a.m., Apr. 7.	Grading, draining, paving	Co. Comrs.
Ia.,	Clarinda	7.30 p.m., Apr. 8.	30,000 sq. yds. concrete pavement	T. A. Wilson, City Clerk.
Wash.,	Centralia	Apr. 8.	County road	Co. Comrs.
Ind.,	Ft. Wayne	10 a.m., Apr. 8.	Township road	C. H. Brown, Aud.
Mass.,	Swampscott	8 p.m., Apr. 8.	Constructing sidewalk	C. B. Humphrey, Chr.
O.,	Columbus	Apr. 8.	Grading and paving roads in several counties	J. R. Marker, St. Hwy Comr.
O.,	Novo	Apr. 8.	Grading, draining and constructing bituminous macadam, cost $43,388.	J. D. Davidson, Clk.
Wis.,	La Crosse	Apr. 8.	2,635 sq. yds. asphalt macadam; 1,827 ft. cement curb and gutter	Board Public Works.
N. D.,	Glen Burn	2 p.m., Apr. 8.	One elevating road grader	Peter Carlson, Co. Aud.
Minn.,	New Ulm	5 p.m., Apr. 8.	Grading, graveling and boulevarding	A. J. Meyer, City Clerk.
Ind.,	Boonville	10 a.m., Apr. 8.	Grading, draining and paving highway	Board Co. Comrs.
S. D.,	**Plankinton**	**Apr. 8.**	**15 miles highway**	**E. Johnson, Co. Aud.**
O.,	Columbus	noon, Apr. 9.	Improving and macadamizing roads	J. Scott, Clk. Bd. Co. Comrs.
Ala.,	**Greensboro**	**Apr. 9.**	Graveling road, cost $6,542	County Comrs.
Mo.,	Kansas City	11 a.m., Apr. 9.	Grading and draining two roads	R. T. Proctor, Hwy. Engr.
Ind.,	Albion	Apr. 9.	7,000 sq. yds. paving	C. Hardenbrook, City Clk.
Ind.,	Crown Point	1 p.m., Apr. 10.	Gravel roads	Co. Comrs.
Mich.,	Central Lake	Apr. 10.	Constructing 4 miles highway	Township Board.
O.,	Athens	Apr. 10.	1¼-inch brick paving and concrete curbing	G. A. Coe, Co. Aud.
Tenn.,	Nashville	Apr. 10.	Paving, various materials	J. W. Wilkerson, Comr. Sts.
O.,	Portsmouth	1 p.m., Apr. 10.	Paving 2,260 ft.	T. V. Patterson, Aud.
Ind.,	Bluffton	10 a.m., Apr. 10.	Constructing roads in three townships	County Comrs.
Ind.,	Elkhart	Apr. 11.	Constructing county highway	County Comrs.
Wis.,	Richland Center	Apr. 11.	6,056 sq. yds. reinforced concrete pavement, 1,683 ft. curb and gutter	City Clerk.
Minn.,	Duluth	2 p.m., Apr. 11.	Constructing about 32 miles of highway	O. Halden, Co. Aud.
O.,	Smithville	noon, Apr. 11.	Furnishing materials and paving	D. D. Hartzler, Vil. Clk.
O.,	Belle Valley	noon, Apr. 11.	Grading, curbing, paving	H. Roland, Clk.
Wis.,	Racine	Apr. 11.	Paving 7,221 sq. yds. brick; 2,902 ft. combined curb and gutter, and 580 ft. concrete gutter	Board Public Works.
Ky.,	Whitesburg	Apr. 11.	Constructing 6 miles 18-ft. macadamized road	Letcher Fiscal Court.
Mo.,	Webster Grove	Apr. 11.	15,000 sq. yds. 6-in. concrete pavement	R. L. Mook, City Engr.
Ind.,	Goshen	10 a.m., Apr. 11.	Concrete roads	J. W. Brown, Aud.
O.,	Andover	noon, Apr. 13.	Grading, draining, curbing and paving	R. R. Ellis, Vil. Clk.
N. J.,	**Glenridge**	**Apr. 13.**	Furnishing and applying non-asphaltic road oil for 1914.	J. A. Brown, Boro. Clk.
Pa.,	Kingston	7.30 p.m., Apr. 13.	5,500 sq. yds. brick paving on 6-inch concrete; 2,100 lin. ft. stone curbing in concrete	W. J. Wiliams, Sec. Borough.
Pa.,	**Kane**	**Apr. 13.**	**Grading, curbing and paving**	**Town Council.**
Minn.,	Chaska	8 p.m., Apr. 13.	Reinforced concrete approaches to bridge	J. M. Aretz, City Clk.
N. J.,	Glen Ridge	8 p.m., Apr. 13.	Setting bluestone curb	J. A. Brown, Boro. Clk.
N. Y.,	Albany	1 p.m., Apr. 14.	Application of oil by pressure sprinklers in several divisions	J. M. Carlisle, Comr.
Conn.,	Wallingford	Apr. 14.	11,877 sq. yds. bit. bound pavement and 5,166 sq. yds. concrete pavement	W. A. McKenzie, Boro Engr.
B. C.,	Victoria	4 p.m., Apr. 14.	Semi-portable asphalt plant	Purchasing Agent.
O.,	**Niles**	**Apr. 15.**	**Paving six streets; brick on slag foundation**	**J. N. Cowdrey, Dir Pub. Serv.**
Iowa,	LeMars	8 p.m., Apr. 15.	Paving one street	E. S. Townsend, City Clk.
Pa.,	Sandy Lake	7 p.m., Apr. 15.	Grading, curbing and paving with brick	L. Craig, Boro. Secy.
Md.,	Frankford	Apr. 15.	14,500 sq. yds. street paving, concrete curbs, sidewalks and storm sewers	B. H. Boynton, City Engr.
O.,	Newark	2 p.m., Apr. 15.	73,032 feet concrete pavement	J. R. Marker, Comr., Columbus.
O.,	Wooster	Apr. 15.	Paving state road with brick	J. R. Marker, Comr., Columbus.
Kan.,	Pittsburg	Apr. 15.	Eight blocks brick pavement	L. Boyd, City Clk.
Pa.,	Grove City	1 p.m., Apr. 15.	Paving with brick	L. Craig, Boro. Sec.
O.,	Columbus	Apr. 15.	13.83 miles concrete road, cost $280,000; 10.12 miles, cost $162,080.	J. R. Marker, State Hy. Comr.
O.,	Paineville	noon, Apr. 16.	Improving ten miles	Co. Comrs.
Ill.,	Monmouth	Apr. 16.	5,011 sq. yds. brick paving; 3,813 ft. concrete curb and gutter	J. Brown, Mayor.
Cal.,	Point Arena	2 p.m., Apr. 17.	Constructing gravel road	Lighthouse Inspector.
La.,	Bossier City	Apr. 20.	Constructing three roads, about 45 miles	W. E. Atkinson, Engr.
N. Y.,	Gloversville	Apr. 21.	Concrete and brick pavement	H. J. Hammer, City Engr.
Pa.,	Sharpsville	6 p.m., Apr. 21.	12,000 sq. yds. brick pavement	W. A. Graber, Sec.
O.,	Hopewell	noon, Apr. 23.	Macadamizing highways	C. Snyder, City Clk.
O.,	Tiffin	1 p.m., Apr. 23.	Macadamizing various roads	C. Snider, Clk.
Ind.,	Bluffton	10 a.m., Apr. 23.	Constructing stone road	Co. Comrs.
Kans.,	Leavenworth	Apr. 24.	8,365 sq. yds. vit. brick pavement, cost $13,574	J. B. Frank, City Engr.
Mich.,	**Crystal Falls**	**Apr. 25.**	Building 5 miles new earth road	County Road Committee
O.,	**Urbana**	**Apr. 26.**	**22,500 sq. yds. pavement**	**Bd. Pub. Service.**
N. J.,	**Newton**	**May 1.**	**Improving 10 miles highway; cost, $100,000**	**H. Snock, Co. Engr.**
Wis.,	Watertown	May 1.	Eight blocks of paving, probably cement	F. S. Webber, City Clk.
O.,	East Liverpool	noon, May. 15.	Paving with brick or paving blocks; eight jobs	E. J. Smith, Dir. Pub. Ser.
O.,	Coshocton	about May 15.	1½ miles brick and slag road	J. R. Marker, Comr., Columbus.
O.,	Canal Dover	about June 1.	Constructing brick pavement	W. E. Sykes, Dir. P. S.

SEWERAGE

O.,	Bedford	noon, Apr. 4.	Furnishing screening and placing filtering material for sewage disposal plant	H. T. Hubbell, Vil. Clk.
Wyo.,	Ft. Yellowstone	11 a.m., Apr. 4.	Constructing outfall sewer	W. L. McLaurn, Quartermaster
Cal.,	Pasadena	Apr. 4.	15.5 miles vit. and salt glazed pipe sewers, cost $50,000	J. W. Scott, City Clk.
O.,	Bedford	Apr. 4.	Furnishing gravel and sand for disposal plant	H. T. Hubbell, City Clerk.
Wis.,	Chippewa Falls	2 p.m., Apr. 4.	Constructing main sewer	Board Public Works.
Me.,	Portland	2 p.m., Apr. 4.	Sewer construction	Selectmen, Mt. Desert.
Tex.,	Houston	2 p.m., Apr. 6.	Constructing storm sewers in eight streets	B. Campbell, Mayor.
Ind.,	La Porte	10 a.m., Apr. 6.	Constructing district sewer	Board Public Works
Pa.,	West Chester	7.30 p.m., Apr. 6.	Furnishing and laying about 20,000 ft. lateral sewers	Boro. Treas.
O.,	Shelby	noon, Apr. 6.	Constructing sanitary and lateral sewer	B. Fix, Vil. Clk.
Ind.,	Hammond	10 a.m., Apr. 6.	Constructing sewer	Board Public Works.
Mo.,	**Poplar Bluff**	**7.30 p.m., Apr. 6.**	**Constructing sanitary sewers, cost $25,756**	**E. C. Thomas, City Engr.**
O.,	Marion	noon, Apr. 6.	Constructing sanitary sewer	E. E. Blazer, Clerk.
N. D.,	**Grand Forks**	**Apr. 6.**	**Construction of lateral sewer**	**Council.**
Minn.,	Carlton	8 p.m., Apr. 6.	Sewers, manholes and flush tanks	A. H. Lee, Vil. Rec.
Mo.,	Hannibal	noon, Apr. 6.	Sewer construction; cost, $30,000	B. F. Smiley, City Eng.
Pa.,	Duryea	7.30 p.m., Apr. 7.	Constructing sanitary sewer	H. Hervat, Boro. Sec.
Ind.,	Decatur	10 a.m., Apr. 7.	Furnishing common drain tile, salt glazed tile, etc., for year	Board Co. Comrs.
Minn.,	Eveleth	8 p.m., Apr. 7.	2,050 ft. sewer ditch	A. P. Romer, City Clk.
O.,	**Urbana**	**Apr. 7.**	**Sewage treatment works**	**J. W. Flaugher, Dir. Pub. Ser.**
Mo.,	St. Louis	noon, Apr. 7.	Constructing brick, cement and vit. clay pipe sewer	Board Public Imp.
Ind.,	Knox	Apr. 7.	Three sewers	Co. Comrs.
Ill.,	Chicago	11 a.m., Apr. 8.	Sewer construction	L. E. McGann, Comr. P. S.
Minn.,	**New Ulm**	**5 p.m., Apr. 8.**	**Sewer**	**A. J. Meyer, City Clk.**

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
N. Y.,	Brooklyn	11 a.m., Apr. 8	Constructing sewers, three jobs	L. H. Pounds, Boro. Pres.
Ind.,	**Angola**	**1.30 p.m., Apr. 9**	**Sewer, 26,700 ft. vitrified pipe; cost, $43,000**	**R. Hirst, City Clerk.**
O.,	Conneaut	noon, Apr. 9	Sewer construction, various streets	S. W. Mahaffy, Dir. Pub. Ser.
Ga.,	Augusta	4.30 p.m., Apr. 9	Changing course of sewers	N. Wingfield, City Engr.
O.,	Lorain	noon, Apr. 9	Constructing sanitary sewers	L. D. Johnson, Clerk.
Sask.,	**Saskatoon**	**Apr. 10**	**Furnishing 19,500 ft. sewer pipe; 460 specials**	**City Comr.**
Ill.,	Farmer City	1 p.m., Apr. 11	Furnishing, hauling and laying tile, etc	Drainage Comrs. of Rutledge, Dist. No. 1.
Mich.,	Otsego	5 p.m., Apr. 13	Constructing sanitary sewer	W. G. Conlin, Vil. Clk.
O.,	Sandusky	10 a.m., Apr. 14	Constructing tile drain	Co. Comrs.
Ind.,	Peru	6 p.m., Apr. 14	Constructing several 12-inch sewers	P. L. Bell, Jr., City Clk.
N. J.,	**Newark**	**Apr. 14**	**Constructing main intercepting sewer**	Passaic Val. Sew. Comn.
Idaho,	Lewiston	Apr. 15	Sanitary sewers	R. T. Bonnell, City Engr.
Sask.,	**Humboldt**	**Apr. 15**	**Constructing sewer system**	**W. H. Stiles, Sec.-Treas.**
Ill.,	**Rankin**	**Apr. 15**	**Constructing storm and sanitary sewer system**	**J. W. Shepard, Vil. Clk.**
Wis.,	Menominee	2 p.m., Apr. 15	For combined sewers	J. R. Mathews, Ch. Bd. P. W.
Ont.,	Simcoe	Apr. 15	Constructing sewers, cost about $50,000	W. C. McCall, City Clk.
Ia.,	Osage	Apr. 15	Sewer system and disposal plant	City Clerk.
Pa.,	Reading	10 a.m., Apr. 15	vit. and iron pipe sewer	E. B. White, City Engr.
Mo.,	Poplar Bluff	Apr. 16	Sanitary sewer system, cost $25,756	E. C. Thomas, City Engr.
Wis.,	Ripon	4 p.m., Apr. 27	875 feet sewer	J. W. Pierce, Clerk.
W. Va.,	Bluefield	Apr. 31	Installing 17,000 ft. sanitary sewers	J. T. Akers, Aud.
Ia.,	Sumner	May 6	Four miles sewers	City Clerk.

WATER SUPPLY

Man.,	Kirkfield	noon, Apr. 4	3,100 ft. 8-inch, 30,300 ft 6-inch water pipe; 71 hydrants with valves, etc	F. Ness, Clerk.
Manitoba,	Assiniboia	noon, Apr. 4	Laying water pipe	F. Ness, Clk. P. O., Kirkfield Park.
Fla.,	Jacksonville	8 p.m., Apr. 6	Furnishing about 3,000 water meters; contract 12 months; remodelling water works	F. Richardson, Chr.
Iowa,	Winterset	7.30 p.m., Apr. 6	Furnishing 25 meters, rubber valves, etc	H. S. Ely, Clk.
Ind.,	Crown Point	7.30 p.m., Apr. 6	Wooden water mains and fittings	H. W. Barry, City Clerk.
Belgium,	**Antwerp**	**Apr. 6**	**High Pressure pumps**	**Burgomaster.**
Alta.,	**Banff**	**Apr. 6**	**13,500 lin. ft. 20-in. steel pipe; 12,000 ft. 6-in. c.-i. pipe**	**L. Pereira, Sec. Dept. Interior, Ottawa.**
Fla.,	Jacksonville	8 p.m., Apr. 6	Gates valves and c.-i. pipe	F. Richardson, Chr.
Mich.,	Highland Park	Apr. 6	Constructing 250,000 gals. elevated tank	L. B. Beekley, Supt. P. W.
Miss.,	Tunica	Apr. 7	Installing water works system	M. J. Alexander, City Clk.
Ky.,	Oakdale	Apr. 7	Installing about ten standard fire hydrants	J. L. O'Neill, City Clerk.
Minn.,	New Ulm	5 p.m., Apr. 8	Laying 4,370 ft. 6-in. water mains	A. J. Meyer, City Clk.
Ill.,	Chicago	11 a.m., Apr. 8	Constructing water supply pipe	L. E. McGann, Comr. P. S.
Ariz.,	Wickenburg	Apr. 8	Constructing water works system, complete	City Clerk.
N. J.,	**Allendale**	**Apr. 9**	**Constructing water works**	**C. F. Smith, Boro. Clk.**
R. I.,	Newport	Apr. 11	Deepening suction well, screen pit, etc	H. R. Stanford, Ch. Navy Dept., Washington, D. C.
Mich.,	Highland Park	Apr. 13	Constructing water supply system	Board Public Works.
N. J.,	Asbury Park	Apr. 13	Air compressors, pumps, c.-i. pipe, etc	S. H. Calvert, City Clk.
N. J.,	Belleville	Apr. 14	Laying c.-i. pipe, valves, valve boxes, etc	E. E. Mathes, City Clk.
Ill.,	Byron	3 p.m., Apr. 14	Water works extension, $4,000	City Clerk.
Ore.,	Klamath Falls	Apr. 14	Constructing storage reservoir	City Clerk.
Ill.,	Byran	3 p.m., Apr. 14	Water works extension, cost $4,000	City Trustees.
N. Y.,	New York	11 a.m., Apr. 14	Constructing portion of Queens conduit	Comrs. Bd. Water Supply.
Ia.,	**Muscatine**	**Apr. 14**	**Pumping plant**	**Co. Supvrs.**
Ore.,	Bonanza	Apr. 14	Constructing storage dam, diversion dam	J. Bowne, Sec. Dist.
S. D.,	Newell	Apr. 15	Constructing 14 miles laterals	U. S. Reclamation Service.
Sask.,	**Humboldt**	**8 p.m., Apr. 15**	**Water works improvements**	**W. A. Stiles, Sec.-Treas.**
Neb.,	Atkinson	noon, Apr. 15	Constructing water works system	Vil. Council.
Minn.,	New Ulm	5 p.m., Apr. 18	4,370 ft. 6-in. water main	A. J. Myer, City Clerk.
O.,	Cleveland	Noon, Apr. 21	Constructing concrete mixing chambers, coagulation basins, filtering and main piping	Comr. Pur. & Sup.
Mont.,	Billings	Apr. 25	Ingot iron galvanized culverts	City Clerk.
Fla.,	Wauchula	1 p.m., Apr. 25	Constructing water works and sewer systems	Bond Trustees.
Ia.,	**Sheffield**	**May 1**	Constructing water works and sewer system	City Clerk.
O.,	Wooster	about May 1	Water works improvement	R. H. Hunter, City Engr.

LIGHTING AND POWER

Pa.,	Philadelphia	Apr. 4	Two 200 k.w. generator sets, cost $12,000	Navy Dept., Washington.
Ill.,	Chicago	Apr. 4	Lighting and power system in pumping station	L. E. McGann, Comr. P. S.
D. C.,	Washington	2 p.m., Apr. 6	Furnishing and delivering cast iron posts	District Comrs.
Fla.,	Jacksonville	3 p.m., Apr. 6	Furnishing lamps, one year, cost about $3,500	F. Richardson, Chr.
Iowa,	Winterset	7.30 p.m., Apr. 6	1,000 electric lamps, 500 lbs. insulated wire, 500 lbs. copper wire, etc	H. S. Ely, City Clk.
Wis.,	Kenosha	Apr. 6	Installing ornamental lighting system and furnishing current	G. W. Harrington, City Clk.
N. J.,	Garwood	8 p.m., Apr. 7	74 25-c.p. incand. street lamps and one arc lamp	C. H. Klein, Boro. Clk.
Ill.,	Chicago	11 a.m., Apr. 8	Motor generator set	G. B. Young, Comr. Health.
N. Y.,	Utica	1 p.m., Apr. 10	Furnishing 1,000 mazda lamps	A. L. McAdam, Clk.
Cal.,	**Covina**	**(about) Apr. 15**	**Material for ornamental street lighting system**	**G. Desery, Engr., Los Angeles.**
La.,	Eunice	2.30 p.m., Apr. 16	Electric light plant	Mayor.
O.,	Hamilton	10 a.m., Apr. 18	Lighting fixtures for court house	W. W. Crawford, Co. Aud.
Ind.,	Indianapolis	Apr. 20	Ten-year lighting contract	J. T. Jeup, City Engr.
W. Va.,	**Wheeling**	**Apr. 20**	**Fireproof power house; one 115 horse-power boiler**	**Maj. J. P. Jervey, Corps. Engrs., U. S. A.**
B. C.,	Fernie	May 7	Complete tungsten street lighting system	J. E. Finn, Sup. Lt. & Power.

FIRE EQUIPMENT

Del.,	Wilmington	5 p.m., Apr. 4	Erecting fire house	W. E. Hance, Architect.
Okla.,	Anadarka	Apr. 6	One motor combination chemical and hose wagon	C. Slemp, Chief.
N. Y.,	New York	3 p.m., Apr. 6	Furnishing and securing in position fire extinguishers	C. B. J. Snyder, Sup. School Bldgs., 500 Park Ave.
N. Y.,	No. Tonawanda	Apr. 8	One hook and ladder truck	Board Fire Comrs.
Ariz.,	Douglas	8 p.m., Apr. 9	One combination auto hose and chemical wagon	J. A. Howell, City Clk.
Pa.,	Erie	Apr. 9	5,000 feet 2½-inch cotton rubber-lined fire hose	J. C. Dundon, Sup. Dept. Pub. Safety.
R. I.,	Providence	2.15 p.m., Apr. 13	General contract for fire station; cost, $30,000	J. H. Gainer, Mayor.
D. C.,	Washington	Apr. 27	Furnishing and installing new boiler and rebuilding engine	Purchasing Officer.

BRIDGES

Utah,	Salt Lake City	10 a.m., Apr. 4	Reinforced concrete bridge	L. P. Palmer, Co. Clerk.
N. D.,	Grand Forks	10 a.m., Apr. 6	Constructing all steel and concrete bridges during the year	H. Anderson, Co. Aud.
N. D.,	Shafer	4 p.m., Apr. 6	Furnishing carload, mixed sizes, steel culverts	O. P. Benson, Co. Aud.
N. D.,	Fessenden	2 p.m., Apr. 6	Metal culverts	Co. Comrs.
Ind.,	Boonesville	2 p.m., Apr. 7	11 bridges	Co. Comrs.
Ia.,	Sioux City	noon, Apr. 7	Constructing 6 bridges	E. E. Hosmer, Aud.
Kan.,	**Manhattan**	**Apr. 7**	**Constructing concrete bridge**	**G. H. Hungerford, Co. Clk.**

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Ill.,	Peoria	Apr. 7.	Two concrete bridges	Joint Committee, Court House
N. D.,	Napoleon	2 p.m., Apr. 7.	Sixty 12-inch, three 18-inch and one 24-inch galvanized corrugated metal culverts	Board of Comrs.
Minn.,	Little Falls	2 p.m., Apr. 7.	Building highway bridge, 90-foot span	B. Y. McNairy, Co. Aud.
Ind.,	Winamac	Apr. 7.	18 bridges; cost, $23,000	C. E. Paul, Co. Surveyor.
Neb.,	Sutherland	Apr. 7.	Constructing bridge	C. W. Yost, Co. Clerk.
Wyo.,	Thermopolis	Apr. 7.	Constructing bridge	H. M. Hantz, Clerk Bd. Comrs.
S. D.,	Salem	2 p.m., Apr. 7.	Furnishing galv. corrugated metal culverts for the year.	A. E. Ecklein, Co. Aud.
N. D.,	Devils Lake	2 p.m., Apr. 7.	Constructing 6 bridges	J. A. Kramer, Co. Aud.
Minn.,	Little Falls	2 p.m., Apr. 7.	Constructing state bridge	B. Y. McNairy, Co. Aud.
Ia.,	Anamosa	10 a.m., Apr. 7.	Constructing bridges and culverts	E. J. Hines, Co. Aud.
N. D.,	Hillsboro	3 p.m., Apr. 8.	Furnishing materials for constructing steel and concrete bridges	County Comrs.
Ore.,	Gold Beach	5 p.m., Apr. 9.	Reinforced concrete bridge to cost $35,000	J. M. Caughell, Co. Sur.
Ind.,	Newton	1 p.m., Apr. 9.	Constructing bridges	E. Simon, Co. Aud.
Ind.,	Crown Point	10 a.m., Apr. 9.	Reinforced concrete bridge	Co. Comrs.
O.,	Cincinnati	noon, Apr. 10.	Repairing suspension bridge	County Comrs.
O.,	Columbus	noon, Apr. 10.	Bridge approaches and superstructures	County Comrs.
Neb.,	Omaha	noon, Apr. 14.	Constructing 240-foot span bridge	F. Ewey, Co. Clk.
O.,	Montgomery	10 a.m., Apr. 14.	Reinforced concrete arch bridge	Co. Comrs.
O.,	Delaware	noon, Apr. 14.	Erecting bridges	W. V. Aldrich, Co. Aud.
O.,	Hamilton	10 a.m., Apr. 15.	Constructing bridges	W. W. Crawford, Co. Aud.
N. Y.,	Oswegatchie	Apr. 15.	Concrete steel arch bridge	N. Wells, Town Clk.
Tex.,	Houston	2 p.m., Apr. 20.	Constructing bridge	B. Campbell, Mayor.
O.,	Hamilton	10 a.m., Apr. 23.	Constructing bridge, steel or concrete	W. W. Crawford, Co. Aud.

MISCELLANEOUS

Ill.,	Chicago	11 a.m., Apr. 4.	5,045 feet creosoted oak piles	L. E. McGann, Comr. P. S.
Ill.,	Chicago	noon, Apr. 6.	Laboratory supplies and apparatus	G. B. Young, Comr. Health.
Pa.,	Llanerch	8 p.m., Apr. 6.	Collection and disposition of garbage	H. P. Morse, Secy.
Ill.,	Springfield	9 a.m., Apr. 6.	Furnishing and erecting additional equipment for stone crusher plant	State Board of Prison Industries.
Ind.,	South Bend	11 a.m., Apr. 6.	Ten road rollers, and one 20-bbl. sprinkling wagon	C. Sedgwick, Auditor.
N. Y.,	Brooklyn	3 p.m., Apr. 6.	Installing heating and ventilating apparatus	Supt. School Bldgs.
Ill.,	Chicago	11 a.m., Apr. 6.	Delivering granite blocks	L. E. McGann, Comr. P. S.
Ill.,	Chicago	11 a.m., Apr. 8.	Two light automobile trucks, and 200 drinking fountains.	L. E. McGann, Comr. P. S.
N. J.,	Red Bank	11 a.m., Apr. 8.	Building culvert, retaining wall, etc.	J. M. Corlies, Dir.
Ill.,	Chicago	11 a.m., Apr. 10.	Architectural iron work, concrete and iron fence at bath house; boilers, etc., for pumping station	L. E. McGann, Comr. P. S.
O.,	East Cleveland	Apr. 11.	Collection and disposal of garbage, 1 year	A. H. Graham, Dir. Pub. Ser.
Cal.,	Oakland	Apr. 13.	Constructing part of auditorium	F. M. Smith, City Clk.
La.,	Rayville	Apr. 13.	Erecting jail building	Pavrot & Livaudias, Architects, New Orleans.
O.,	Lorain	noon, Apr. 27.	Constructing subway	L. B. Johnson, Clerk.
Mo.,	Richmond	May 1.	Constructing court house; cost, $100,000	J. J. Pardue, Co. Treas.
Ark.,	Little Rock	3 p.m., May 1.	Alterations in post office and court house	O. Wenderoth, Sup. Architect, Washington, D. C.

STREETS AND ROADS

Colusa, Cal.—Bond issue has been carried for roads, bridges and culverts.

Sacramento, Cal.—Superior California Counties continue to demonstrate their interest in road improvement by co-operating with State in making possible sale of State highway bonds. Humboldt County has taken first installment of $150,000 of bonds, and telegram from Eureka assures Commission that more than $1,000,000 will be subscribed when necessary.

San Francisco, Cal.—Board of Works has approved plan of parking Geary St. and Point Lobos Ave. from 38th to 48th Aves.

San Francisco, Cal.—The Mission Promotion Association has appointed a committee to request Board of Supervisors that $25,000 be set aside in tax budget of 1914-15 for construction of twenty-four-foot asphalt trip in center of Corbett road from its intersection with Sloat Boulevard to Sanford Heights.

San Francisco, Cal.—Provision will be made in tax budget of 1914-15 for improvement of several boulevards in district beyond Twin Peaks, according to Thomas Jennings, chairman of Finance Committee of Board of Supervisors. Paving and laying of thirty-foot asphalt strip along Sloat boulevard from Great Highway to intersection of Junipero Serra boulevard will doubtless be one of first considerations. Funds are now available for paving of Junipero Serra boulevard to county line, and City Engineer O'Shaughnessy said that bids for work would be called for not later than April 8. Estimated cost of this work is $32,000. Considering paving of Sloat and Junipero Serra boulevards with thirty-foot asphalt strip, as one job, the approximate length from Great Highway to county line is 19,000 feet. Total area in strip thirty feet wide is 570,000 square feet, and approximate cost at 18 cents a square foot is $102,600. Supervisors have been asked to construct a twenty-four-foot asphalt strip on Corbett road, from Sloat boulevard around Twin Peaks to intersection of Seventeenth and Ashbury streets, distanc eof about 15,000 feet, at cost of $64,800. Residential Development Company, Westgate Park Company and Forest Hill Realty Company have joined in offer to spend between $30,000 and $35,000 in widening, grading and aligning Corbett road, if city will lay asphalt strip.

San Jose, Cal.—Plans for improving the 120-foot boulevard between this city and Santa Clara, known as Alameda and historic as part of El Camino Real, have been announced. Property owners, the street railroad company and the county and State Highway commissions will join in improvement, which will cost nearly $200,000 and will include asphalt pavement and electroliers every 100 feet on either side of three-and-a-half-mile stretch of road.

Woodland, Cal.—By virtue of decision reached here by Supervisors, Yolo county will purchase $300,000 worth of State highway bonds.

New Castle, Del.—Resolution has been adopted directing President Cavender to advertise for sale the $30,000 worth of street bonds. Council will meet on April 21 to open bids for the bonds.

Wilmington, Del.—Nineteen bids were received for sinking fund bond issue of $255,000. Entire issue was awarded to Harris, Forbes & Co., of New York, at their bid of 104.592. Of total, $150,000 is for street improvements to complete work authorized under act providing for a $400,000 bond issue passed four years ago. Water Board will receive $50,000 for water meters throughout city, the remaining $55,000 will be to refund Water Board bonds falling due May 1 and June 1 of this year.

Jacksonville, Fla.—Question of county bonding itself for $1,000,000 or for $1,-500,000 for street improvements is being considered.

Atlanta, Ga.—Work on grading of Spring St. from 18th to 19th Sts., and grading of city school lot on Spring St. will commence at early date.

Waukegan, Ill.—Paving of Tenth St. is being discussed. Estimated cost, $18,205.65.

Harrison, Ind.—Bids will be sold on April 6 in sum of $6,500 for gravel roads. G. H. Newbauer is Treasurer.

Huntington, Ind.—Five petitions asking for improvement of Goshen road from end of pavement on North Jefferson St. to township line with a concrete road, are being circulated in Huntington Township.

Indianapolis, Ind.—Resolutions for paving number of streets have been confirmed by Board of Public Works and bids for improvements will be advertised for immediately. Streets to be improved under resolutions and estimated cost are as follows: Rural street from Michigan to Tenth St., $26,493; DeQuincy St., from New York to Michigan St., $7,-621; Dearborn St., from Washington to New York St., $10,139; from New York to Michigan St., $9,317, and from North to Tenth St., $16,382; and Johnson Ave., from Washington St. to the Pennsylvania railroad tracks, $10,740.

Indianapolis, Ind.—Board of Park Commissioners has adopted resolution taking over for boulevard purposes 38th St., from Capitol Ave. to Fall Creek, and Board of Public Works will approve resolution as soon as city legal department has passed on it favorably.

Lafayette, Ind.—Many petitions for street oiling have been presented.

Niles, Ind.—Issue of $13,220 worth of Niles and Union Township road bonds has been sold by County Treasurer Gola Williamson to Merchants' National Bank.

Tell City, Ind.—City Council has recommended use of crude oil on streets of this city during summer months. Former experiments with oil proved successful in laying the dust and in maintaining roadbed.

Vincennes, Ind.—City Engineer Watts has reported favorably on building sidewalks and curbing on North First St., from Busseron to Eberwine Ave., and has been ordered to prepare plans and specifications.

Iowa City, Ia.—Board of County Supervisors will spend $40,000 for street and bridge improvements.

Keokuk, Ia.—See Sewerage.

Keokuk, Ia.—A new street, approximately three block long, running from near corner of 13th and Palean to 11th and Ridge, will be constructed this summer, in accordance with ordinance passed by City Council.

Coffeyville, Kan.—Resolution calling for construction of sidewalks in First and Fourth Wards of the city has been placed on its third and last reading and adopted. Clerk has been instructed to advertise for bids on the work.

Emporia, Kan.—City Clerk will advertise for bids for paving of West St.

Leavenworth, Kan.—Ordinances have been approved for improvement of various streets.

Lexington, Ky.—Resolutions have been adopted for improvement of various streets.

Louisville, Ky.—Ordinances have been adopted for improvement of various streets.

Haverhill, Mass.—The Essex County Commissioners have opened and awarded bids for a $50,000 four per cent. bridge and highway loan, to Hayward Wilson of Boston and Keene-Taylor Co. of New York, jointly.

Lawrence, Mass.—Purchasing Agent McConnor has received four bids on contract to furnish 10,000 feet of edgestone for sidewalk department. Proposals follow: John Marinal, of North Chelmsford, 46 cents per foot; Pease Granite Co., of Milford, 45 cents; Lovejoy Granite Co., of Milford, 45 cents, and Lewis Palmer & Son, of Graniteville, 45½ cents.

Lynn, Mass.—County Commissioners have issued their decree for laying out of Humphrey St., Swampscott, to uniform width of 70 ft. in such a way as to widen, straighten and relocate street, according to plan prepared by Massachusetts Highway Commission.

North Adams, Mass.—Committee on roads and bridges of Legislature have reported in favor of appropriation by Legislature of $10,000 as special appropriation for continuance of building of state road between Williamstown and Pittsfield.

Weston, Mass.—Appropriation of $18,000 for streets has been authorized.

Albion, Mich.—Total cost of paving of several streets, as estimated by Board of Public Works, is $55,000. The pavement on East Erie is to extend from Superior St. to Ingham St., and total cost is estimated at $17,798.82. From Superior St. to Ionia pavement is to be of vitrified brick, and from thence to Ingham St. asphaltic concrete will be laid. The M. U. T. is required to pay for pavement between its tracks and one foot six inches on either side. Fifty per cent. of balance will be charged to the property owners. Cost of the West Erie St. pavement is estimated at $9,692.81, and will extend from Superior St. to Eaton. From Superior St. to Clinton the pavement will be of vitrified brick and rest will be of asphaltic concrete. For Irwin Ave. pavement estimated cost is $11,437.98, and it will extend from Superior St. to Dalrymple Boulevard. North Superior St. pavement will extend from Vine to Austin Ave. and from thence west along Austin to Eaton St. Estimated cost is $5,091.78, and from Vine St. to Austin Ave. will be of vitrified brick.

Battle Creek, Mich.—City Clerk will receive bids until April 27 for purchase of $30,000 bonds for paving.

Ironwood, Mich.—The Iron county road commissioners have authorized construction of six additional miles of highway this year. Five will be on Beechwood and one on Amasa road. Construction of five miles on Beechwood route will bring Iron within six miles of Gogebic line.

Chillicothe, Mo.—Plans and specifications for paving of Polk St. have been presented to City Council by City Engineer Jo Broaddus and accepted, and resolution for paving of street ordered drawn.

St. Joseph, Mo.—Delegations from several Western states have organized Pike's Peak Ocean to Ocean Highway. Plan is to build road which will run through Illinois from Springfield to Hannibal, Mo.; St. Joseph, Mo., and Colorado Springs to Pacific Coast. It is to connect with road from East at Springfield. Road already has been laid out.

Newton, Miss.—Election wil shortly be held for voting on bond issue for graveling roads of Lauderdale County.

Stillwater, Mont.—Sum of $75,000 will be spent on highways this summer.

Omaha, Neb.—Nebraska counties are preparing to do work on route of Lincoln Memorial highway this summer. Several county boards of supervisors have instructed their road workers to secure plans from highway association and do all preliminary work this year. Greene County, Iowa, supervisors have voted $20,000 for work on highway.

Nashua, N. H.—A plea for passage of special resolution of $7,500 to be used with state aid to equal amount for construction of Southside state highway, out Milford way has been made before Board of Mayor and Aldermen on part of committees representing Nashua Board of Trade, and other civic organizations and citizens.

Elizabeth, N. J.—County road committee of Union County Board of Freeholders have put in request for $100,000, and have mapped out work it is proposed to do during summer. If this sum is obtained from State, it will mean that $256,306.42 will be expended on roads this summer, as from other sources freeholders will receive $156,306.42. As laid out, work includes paving following roads at estimated cost given: Westfield avenue, from Bayway, Elizabeth, to Walnut street, Roselle Park, $28,800. Westfield avenue, from Locust street, Roselle Park, to the Rahway River, in Cranford, $36,000. Wood avenue, from St. George avenue, to Edgar road, through Linden and Linden township, $23,400. Morris avenue, from Farmers' Hotel, Springfield, to Glenside avenue, Summit, $36,409. Mountain avenue, from Westfield to Springfield, as one contract at $8,900, and the same highway from Union to Fanwood, as another contract at $42,400. St. George avenue, Rahway, from Leesville avenue to the Middlesex county line, $12,000.

Millville, N. J.—See Miscellaneous.

Paterson, N. J.—Board of Works will shortly begin necessary street repairs.

Plainfield, N. J.—The North Plainfield Borough Council has planned number of improvements to be made during present year. Chief among these is macadamizing of West End Ave. from intersection of Rockview Ave. to Greenbrook road.

Binghamton, N. Y.—Every effort will be made by residents of Sixth Ward who are interested in having pavement laid in that section of city this year to carry bonding election which will be held on April 17.

Brighton, N. Y.—Town is planning various road improvements.

Greenwich, N. Y.—Bids will be received until April 1 for $100,000 of highway bonds.

Harrietstown, N. Y.—Sum of $10,200 will be expended on town roads during coming summer.

Hempstead (L. I.), N. Y.—On Main St. $5,000 will be used for extension of bitulithic pavement, which now extends on Main St., from Fulton St. to Front St., and also on Front a distance of a block.

Lestershire, N. Y.—Plans are under way to circulate in near future, petitions urging another appropriation for improvements to Pagoda Park and other civic betterments now before village authorities.

Lynbrook, N. Y.—Sum of $3,000 has been appropriated for better roads and highways.

Lyons, N. Y.—Town Board has appropriated $3,000 for building stone road leading south from Lyons on old Preemption road into town of Phelps and $800 for stone road beginning at Frank Fellows farm in West Lyons.

Massena, N. Y.—Bids will be received by Board of Trustees at 8 p. m., April 7, for bonds in sum of $18,000 for highway improvements. Also bonds in sum of $31,250. I. H. Mullarney is village clerk.

Newburgh, N. Y.—Supervisor William I. Duffy, of Town of Highlands, has announced that contract for construction of Highland Falls-Rockland county line section of trunk highway No. 3 will be awarded this spring.

Schenectady, N. Y.—The Nott Street-Thomas' Corners county highway, over Maxon Road, having been approved by State Highway Department, Board of Supervisors have voted to appropriate $12,437.67 to cover county and city's share of cost of work, which is proportioned as follows: State, $18,362.33; county, $10,780; city, $1,657.67; extra to city, $5,200. Total cost of improvement is $36,000.

Troy, N. Y.—City will receive bids on April 7 for paving Tibbitts Ave. Estimated quantities as follows: 10,000 sq. yds. pavement, 6,200 lin. ft. concrete curb with curb protector. Estimated cost, $40,000. Also on People's Ave., 9,000 sq. yds. pavement, 4,200 lin. ft. concrete curb with curb protector. Estimated cost, $24,000. Also Sixth Ave., 5,200 sq. yds. pavement, 2,200 lin. ft. of curb. Estimated cost, $16,000. A. E. Roche is City Engineer.

Lima, O.—Ordinance has been passed for improvement of South Metcalf street.

Lima, O.—Legislation has been passed or is pending for improvement of eleven streets to cost more than $100,000 and of which proportion of city will be some $20,000. This includes North street from Main to Scott, which is to cost about $22,000, and of which city's proportion will be some $5,800. Money for this has been provided and contract let to W. F. Jameson.

Painesville, O.—Bids will be received April 16 for improving 10 miles of road in Madison Township by grading, draining and paving. Roads are South Ridge road and Lake River road. Bids will be on one course concrete; two course concrete and brick or warrenite on concrete foundation. H. P. Cumings is County Engineer.

Youngstown, O.—City Council will pave Kensington, Haseltine Aves., Garlick, Halleck, Blain and Byron Sts.

Portland, Ore.—City improvement bonds amounting to $112,924 were sold by city to Security Savings & Trust Company of Portland.

Connellsville, Pa.—City is preparing to make bond issue of $100,000, or more, for funding and improvement purposes. Information can be secured from John L. Gans, Superintendent of Accounts and Finance.

Ellwood City, Pa.—Bond issue will be considered for paving of several streets.

Erie, Pa.—A new highway to be known as Trans-Pennsylvania road that will pass through Erie and connect with New York state on east and Ohio on west is now being talked of.

Erie, Pa.—Four paving ordinances have been introduced by Director Eichhorn and referred to council as committee of whole. Streets to be paved are Wallace street, between Second and Fifth streets; Eighth street, from Cranberry street west; Washington place, from Eighth to Eleventh street, and Cranberry street, from Eighth to Eleventh street.

Hazleton, Pa.—Covering of Broad street with sheet asphalt is being discussed.

New Castle, Pa.—City is planing to put a $30,000 bond issue for street building on the market.

Scranton, Pa.—County Commissioners Thomas, Butler and Allen have big road building program for 1914 and made it apparent that they propose to go along with same and provide passable and good roads in many parts of county. There is total mileage provided for that reaches to about 18.

Scranton, Pa.—It has been stated authoritatively by County Commissioners that there would be another issue of bonds soon amounting to $180,000 to build county roads. This particular amount will be used for road between Peckville and Jessup and Moosic Lake.

West Hazleton, Pa.—Bids will be received by Wm. Krapf, Secy. Borough Council, until 7 p. m., May 1, for purchase of $50,000 bonds for paving of Broad St. and completion of sewer system.

Providence, R. I.—The highway committee of City Council will be called on to make recommendations concerning widening of Thayer St., between Angell and Waterman Sts.

Savannah, Tenn.—At last meeting of county court here order was passed for election to be held in August to decide whether or not Hardin County should issue two hundred thousand dollars in bonds for purpose of building good roads.

Austin, Tex.—Bond issue for $250,000 for Hill County road district No. 1 has been approved by Attorney General's Department.

Bay City, Texas.—Matagorda County will within next 30 to 60 days offer for sale $461,000 worth of road, drainage and levee bonds. These bonds have already been voted and are now being registered by county clerk preparatory to placing them on market.

Commerce, Tex.—The citizens of commissioners' precinct No. 4 will, on April 11, vote on issuance of road improvement bonds in sum of $200,000.

Corpus Christi, Tex.—City council has passed under emergency clause resolution calling for election for April 20 to determine whether or not bonds in sum of $50,000 shall be issued for permanent street improvements.

Fort Worth, Tex.—Proposal to construct highway from Fort Worth northwest to Roswell, N. M., has been accepted.

Galveston, Tex.—According to statements issued, following counties have issued good roads bonds within past few weeks which will materially benefit highways in dieffrent sections of state: Brooks County, $34,000; Bastrop, Elgin Precinct, $30,000; Collins, Farmersville Precinct, $200,000; Collins, Culleake Precinct, $65,000; Collins, Princeton Precinct, $100,000; Collins, Celina Precinct, $125,000; Garza, entire county, $50,000; Harrison, Marshall Precinct, $300,000; Hays, Kyle Precinct, $650,000; Hill, Itasca Precinct, $150,000; McLellan, Justice Precinct 1 and 8, including Waco, $1,075,000; Milam, Thorndale Precinct, $100,000; Palo Pinto, Mineral Wells Precinct, $100,000; Kaufman, Forney Precinct, $250,000.

Houston, Tex.—More than 200 citizens from Alvin, Pearland, Manville and different parts of Brazoria County are urging commissioners of Harris County to improve road which will connect with Brazoria County roads.

San Marcos, Tex.—Commissioners' Court will call election for April 25, to vote $100,000 good roads bonds. This is to be applied by two precincts through which highway passes on National Postal Highway, and other precincts will get their proportionate amount of bonds voted.

Yoakum, Tex.—Bond issue for street improvements has been carried.

Salt Lake City, Utah.—Good roads committee of Salt Lake Commercial Club propose to ask Salt Lake County Commissioners to build three miles of road somewhere in county this year for purpose of arriving at cost of such construction and determining quality of various kinds of road. Suggestion will be made to commisisoners that three kinds of material be used in construction of roads, each of materials to stretch over one mile of roadway. When three roads are constructed tests will begin to determine which kind of road material is best. Material standing test best during given time will then be recommended for use in 53 miles of good roads proposed in Salt Lake County when $1,000,000 good roads bond issue was under consideration early in year.

Salt Lake City, Utah.—By unanimous vote city commission, in committee of whole, has decided to pave Fourth South from west end of viaduct to Eighth West and to pave Eighth West from Second South to Sixth South. It was voted, also, that Eighth West should be paved from Sixth South to Tenth South, but this work will not be done before next year. Cost to city will be about $20,000.

Salt Lake City, Utah.—City Engineer has been instructed to prepare plans and specifications for resurfacing of 2d South from Main to West Temple, and for paving 3d West from North Temple to 1st North.

Norfolk, Va.—Resolution is being considered appropriating $10,591 for paving, curbing, guttering, etc., in Bowden's ferry road.

Centralia, Wash.—Petition has been placed in circulation among interested property owners asking for improvement of Chehalis Ave., in southeast part of city.

Superior, Wis.—Bids for paving of Ogden Ave., from North Fifth St. to Belknap St., have been opened by Board of Public Works. Firm of Fielding & Sheppley were low bidders on creosoted blocks. Peterson & Holm were low on concrete and brick. The White Construction Co. was low on asphalt. Bids follow: Bitulithic—Warren Brothers Co., $60,938.60. Concrete—Peterson & Holm, $34,791.04; Walsh & Johnson, $36,927.30; E. A. Dahl, $39,965.60; John Diffor, $36,665.80. Sheet asphalt—White Construction Co., $41,749.60; Fielding & Shepley, $42,875.94; Walsh & Johnson, $45,095.50; E. A. Dahl, $43,387.90. Brick—Peterson & Holm, $52,834.99; Fielding & Sheppley, $54,404.58; Walsh & Johnson, $56,583.70; E. A. Dahl, $54,611.10; John Diffor, $53,405.05. Creosoted blocks—Peterson & Holm, $54,266.65; Fielding & Sheppley, $51,296.23; Walsh & Johnson, $57,973.40; E. A. Dahl, $55,029.50.

Neenah, Wis.—Board of Public Works is discussing paving of Nicolet Ave. Estimated cost, $9,000.

Superior, Wis.—A resolution ordering North 14th St. paved, from Tower Ave. west to Banks Ave., will be introduced at next meeting of City Commission. It is possible that improvement will be carried as far west as Oakes Ave. Street will have concrete base, and wearing surface of such material as majority of property owners favor.

CONTRACTS AWARDED.

Luverne, Ala.—To J. F. Giddens & Co., of Troy, Ala., at $10,542, for grading, draining and surfacing with sand-clay approximately 8 miles of road, by State Highway Commission.

East San Diego, Cal.—By Board of Trustees, for street improvements, as follows: Conklin Ave., Olaf Nelson, at $44,841.51; Hugo Ave., John Engebretsen, $52,319.84; Storey Ave., E. A. McAlpin, $16,715; Pacific Ave., Olaf Nelson, $16,471.71. Dists. Nos. 17 and 19, Olaf Nelson; Dist. No. 23, E. A. McAlpin, San Diego; Dist. No. 20, John Engebretsen, San Diego.

Santa Ana, Cal.—To Crandall Construction Co., for paving East 4th St. from Santa Fe to city limits.

New Haven, Conn.—C. W. Blakeslee & Co., New Haven, were low bidders, March 25, on about $260,000 sheet asphalt paving. Their average price was a fraction below $1.68 per sq. yd. The total yardage was about 150,000. The average of other bids for sheet asphalt was as follows: Union Paving Co., Schenectady, $1.74; Warner-Quinlan Co., $1.79; Borough Asphalt Co., New York, $1.89; Barker-Bonner Co., New York, $1.95; Continental Public Works Co., $1.97; Newton Paving Co., $1.98; Barber Asphalt Co., $1.98; Schenectady Construction Co., $2.10; Robert E. Daley, $2.20; Field, Barber & Underwood, $2.25. C. W. Blakeslee & Co. submitted sample of Standard Oil Mexican asphalt.

Leesburg, Fla.—City Council has signed contract letting to Mr. W. A. McNally, of Gainesville, construction of about 10,000 square yards of cement sidewalks.

Quincy, Ill.—Firm of Rees Brothers has been awarded contract of paving Sixteenth street, from Maine to Broadway, distance of three blocks, at meeting of board of local improvements. Bidders follow: Rees Brothers, $6,600; Joseph Eiff & Sons, $6,978, and Peter Simons, $6,995. Paving will be of concrete base with tarvia surface.

Silvis, Ill.—To Independent Construction Co., contract, at $22,000, for constructing brick paving in Eighth St.

Fort Wayne, Ind.—To Peter Putnam, of Monroeville, Ind., at $14,229, for construction of 3 miles of stone road.

Ft. Wayne, Ind.—For construction of Tonkel-Warner Stone road, on Perry Cedar Creek Township line, by County Commissioners, to Fred H. Fuelling, at $43,323.

Muncie, Ind.—Two contracts for construction of cement sidewalks have been let by special committee of Council. William Birch was successful bidder for both contracts. First calls for laying of concrete sidewalk on both sides of Hackley St., from Fifth to Seventh St.; and second, for construction of sidewalk on Liberty St., from Eighth St. to alley north of Twelfth St.

Donaldsonville, La.—Police Jury has adopted resolution authorizing President Adolphe Netter to enter into contract with F. F. Rogers, of Alexandria, for construction of approximately 19 miles of gravel roads in First Road District of Ascension Parish, at $2,795 a mile. Contractor shall have right to sublet contract and it is stated that Mr. Rogers has arranged with Lively & Knox, of Baton Rouge, to build the roads.

Beverly, Mass.—Contracts for edgestone, brick, hauling and setting edgestones and laying brick for 1914 have been awarded by City Council Public Service Committee. Contract for granolithic pavements was awarded to Thomas Fitzgibbon for $1.76 the square yard. This was second low bid, lowest bid being by Crosby & Cann for $1.73 a yard. Parry Brick Co. was given contract for furnishing of sidewalk brick at $13 a thousand. Contract for hauling and setting edgestones was awarded to Edmund Cahill, low bidder, for $2.48. The contract for the furnishing of edgestones was awarded to Lovejoy Granite Co. for 57 cts. a linear foot. John C. Fowler was given contract for laying brick sidewalks, his bid tallying $2,423.91 after a readjustment.

Newark, N. J.—Contracts have been awarded to Standard Bitulithic Co. for paving Highland Ave., from Abington to Delevan Ave., at a price of $12,933.25; South 19th St., from South Orange to 15th Ave., for $13,756; Ridge St., from Second to Abington Ave., for $11,230. Other bidders were: Highland Ave., George & O'Connor, $12,989.25, and the Newark Paving Co., $13,158; Ridge St., George & O'Connor, $11,374.25, and Newark Paving Co., $11,528; South 19th St., George & O'Connor, $13,776, and Newark Paving Co., $14,690. Contract to furnish stone crusher has been awarded to Acme Road Machinery Co., whose estimate was $2,094.

Passaic, N. J.—For paving with sheet asphalt, Main Ave., contract was awarded to (1) Union Bldg. & Con. Co., Passaic, N. J., for paving Brikerhoff Place to (2) Newton Paving Co., Trenton, N. J.; and for paving Mercer, Morris and Hudson Sts. to (1) Union Bldg. & Con. Co. Bids were as follows (3) Standard Bitulithic Co., Newark, N. J.: Main Ave.—Sheet asphalt pavement, (1) $1.61, (2) $1.77, (3) $1.67; trap rock block pavement, (1) $1.39, (2) $1, (3) $2.10; concrete curb, (1) 39 cts., (2) 40 cts., (3) 45 cts.; 4x16-inch quarry cut curb in concrete, (1) 70 cts., (2) 70 cts., (3) 80 cts.; 8-inch sewer pipe, (1) 60 cts., (2) 70 cts., (3) 60 cts.; old 16 or 20-inch curb redressed and set in concrete, (1) 35 cts., (2) 35 cts., (3) 35 cts.; round bluestone corners, (1) $12, (2) $12, (3) $12; concrete flay, (1) 20 cts., (2) 16 cts., (3) 17 cts.; manhole heads reset to new grades, (1) $5, (2) $5, (3) $5; noiseless manhole head covers, (1) $8.50, (2) $8.50, (3) $8.50; catch basins, each, (1) $125, (2) $125, (3) $125; 5x16-inch header curb, (1) 70 cts., (2) 70 cts., (3) 70 cts.; old 16 or 20-inch curb set as header, (1) 30 cts., (2) 30 cts., (3) 30 cts.; earth excavation, (1) 60 cts., (2) 50 cts., (3) 45 cts.; bluestone flag, (1) 20 cts., (2) 20 cts., (3) 20 cts. Brinkerhoff Place—Sheet asphalt pavement, (1) $1.85, (2) $1.77, (3) $1.67; flush tank, (1) $90, (2) $85, (3) $125; manholes, (1) $50, (2) $50, (3) $50; noiseless covers, (1) $8.50, (2) $8.50, (3) $8.50; concrete curb, (1) 40 cts., (2) 45 cts., (3) 45 cts.; concrete gutter, (1) 20 cts., (2) 17 cts., (3) 18 cts.; 5x16 header curb, (1) 70 cts., (2) 70 cts., (3) 70 cts.; 6-inch house connections to the curbs, (1) 70 cts., (2) 60 cts.; reset manhole heads, (1) $5, (2) $5, (3) $5; concrete flag, (1) 20 cts., (2) 17 cts. Mercer St., Morris St. and Hudson St.—Sheet asphalt pavement, (1) $1.63, (2) $1.77, (3) $1.97; old 16 or 20-inch curb reset, etc., in concrete, (1) 35 cts., (2) 35 cts., (3) 35 cts.; 5x16 header curb in concrete, (1) 70 cts., (2) 70 cts., (3) 70 cts.; concrete curb and apron, (1) 50 cts., (2) 60 cts., (3) 90 cts.

Brooklyn, N. Y.—By Park Board, for construction of walks, etc., in Brooklyn Botanic Garden, Boro. of Brooklyn, to Di Menna & De Paola, 2336 Cambrelling Ave., Bronx, at following bid: 14,545 sq. yds. bituminous macadam walks, $1.15; 1,179 sq. yds. gravel walks, 55 cts.; 20,300 sq. ft. sod edging, 5 cts.; 235 lin. ft. 8-in. vitr. pipe drains, $1; 3,825 lin. ft. 6-in. vitr. pipe drains, 60 cts.; 87 pipe catch basins, $1; 18 brick catch basins, $25; 45 wooden steps, lump sum, $300; 136 lin. ft. bluestone curb, $1; 2 wooden bridges, lump sum, $100; total, $21,696. Totals of other bids: Borough Asphalt Co., 1301 Metropolitan Ave., Brooklyn, $22,020; Fairfield Landscape Nurseries Co., 103 Park Ave., New York, $28,104; Frank J. Gallagher, 490 Park Pl., Brooklyn, $24,056; Henry E. Kordes, 243 Moffat St., Brooklyn, $22,142; Chas. Meades & Co., 165 Broadway, New York, $29,799; Norton & Gorman Contr. Co., 303 Douglass St., Brooklyn, $22,387; H. Sullivan Co., 20 Lake St., Brighton, Mass., $25,176.

North Tonawanda, N. Y.—By North Tonawanda Board of Public Works contract to Louis H. Gipp, of Buffalo, for paving of Schenk St. from Payne Ave. to Duckwitz St. with brick. Gipp, who was lowest bidder, offered to do work for $17,654.50.

Urbana, O.—By County Commissioners, three contracts for culverts, to Fred Nagel, as follows: Nincehelser culvert, in Wayne Township, at $199.50; Linville culvert on Cable and Woodstock road, at $112.50; Weidman culvert on State road in Salem Township, at engineer's estimate of $150.10.

Conway, Pa.—By Borough Council, contract to S. B. Markley, Rochester, Pa., for constructing 7,000 sq. yds. brick pavement, at $15,000.

Philadelphia, Pa.—It is said that the Newton Paving Co. of Trenton is lowest bidder for bulk of improved paving to value of about $276,000.

Sumter, S. C.—Contract for paving of Liberty St. has been let to William F. Bowe, of Columbia. Street is to be paved with vitrified brick, the Bessemer Paver, same brick which was used on Main St. three years ago, being brick settled upon. Contract was let at price of $2.49 a sq. yd., and as there are 5,250 sq. yds. to be paved, it is estimated that completed work will cost city approximately $14,000.

Dandridge, Tenn.—To R. L. Peters, of Knoxville, Tenn., at $1.75, for 40 miles of macadam pike work during spring and summer.

Houston, Tex.—By Council, contract for paving of McKinney from Velasco to Eastwood, to Eureka Construction Co. Contract price for work is $10,100.

Liberty, Tex.—For constructing 20 miles of shell road in Liberty by Commissioners' Court to Harvey Mecom, of Liberty, at about $100,000.

Temple, Tex.—Contract between Bell County Commissioners and E. A. Kingsley of Little Rock, Ark., for engineering supervision of roads to be built with proceeds of $600,000 bond issue in road district No. 5, largely comprising territory tributary to Temple, has been completed.

Salt Lake City, Utah.—By State Road Commission, for grading of 75 miles of earth road through Box Elder County, to F. Allen and E. Rocker of Tremonton, known as the Roche Tresher Co.

Olympia, Wash.—To S. Normile, 407 Bowman Bldg., Seattle, for McClellan Pass Highway, Naches to Mt. Rainier National Park, as follows: 79,500 cu. yds. common excav., inc. haul of 400 ft., 25 cts.; 43,600 cu. yds. solid rock excav., 40 cts.; 25 acres clearing, $60; 15 acres grubbing, $70; 2,800 cu. yds. slope wall, $1.25; 185 cu. yds. rubble masonry, $2.50; 2,800 lbs. steel I-beams and structural shapes in place, 7 cts.; 6,520 lin. ft. guard rail in place, incl. spikes and bolts, 40

cts.; 70 M ft. timber and planking in place, incl. spikes and bolts, $35; 440 lin. ft. logs for cribbing in place, 25 cts.; total, $66,632. To Wilson Bailey Co., of Walla Walla, for inland Empire Highway Walla Walla Westerly, as follows: 40,500 cu. yds. common excav., including haul of 400 ft., 23 cts.; 118,000 cu. yds. overhaul, each 100 ft., 2 cts.; 1,800 lin. ft. standard guard rail, 20 cts.; 50 cu. yds. hand placed riprap, $2.50; 50 cu. yds. concrete, first class, $12; 270 cu. yds. second class, $11; 3,250 lbs. steel reinforcing bars in place, 5 cts.; 92 lin. ft. plain concrete pipe in place, 12-in. diam., $1.25; 630 lin. ft. 18-in., $1.50; 10,040 lin. ft. side surfacing, 8 cts.; total, $22,756. To W. F. Manney & Co., 6502 Tenth Ave., N. W., Seattle, for McClellan Pass Highway Enumclaw to Mt. Rainier National Park, as follows: 35,500 cu. yds. common excav., including haul of 400 ft., 35 cts.; 4,600 cu. yds. loose rock excav., 40 cts.; 5,500 cu. yds. solid rock excav., $1; 10,000 cu. yds. overhaul on any of above materials per 100, 2 cts.; 48 acres of clearing, $175; 26 acres grubbing, $150; 710 cu. yds. slope wall, $2.50; 70 cu. yds. concrete, second class, $12; 1,100 lin. ft. guard rails in place, including spikes and bolts, 20 cts.; 570 lin. ft. plain concrete pipe in place, 12-in., $1.30; 500 lin. ft. 18-in., $2; 70 lin. ft. 24-in., $3; 30 lin. ft. 30-in., $4; 18,700 lin. ft. side surfacing, 15 cts.; total based on concrete bridges, $49,326.

Seattle, Wash.—For paving 28th Ave., to Barber Asphalt Paving Co. of Philadelphia, at $42,780.12. For paving 13th Ave., South, to M. H. McMullin, at $2,089.

Superior, Wis.—For paving with asphalt 34,860 sq. yds. on Tower Ave., to Fielding & Shepley, of St. Paul, Minn., at $79,274.

BIDS RECEIVED.

Albany, N. Y.—The following were the proposals of lowest bidders which were received by the State Commission of Highways for the construction of public highways by State aid at their office, 53 Lancaster St., Albany, N. Y., on Friday, March 27, 1914:

Road No. 1146, Watervliet City, Third Ave., Albany Co., 0.18 mile: Balotte & Marches, Troy, N. Y., $10,530.55.

Road No. 1169, Chautauqua Lake, Part 5, Chautauqua Co., 0.61 mile: Harry B. Harrison, East Rochester, N. Y., $14,-538.50.

Road No. 5434, Mayville-Westfield, Chautauqua Co., 4.49 miles: S. V. R. Malcolm & Sons, Medina, N. Y., $97,907.

Road No. 5450, Halcottsville-Roxbury, Delaware Co., 6.09 miles: S. B. Van Wagonen, Rondout, N. Y., $65,764.60.

Road No. 5456, Hancock-East Branch, Part 1, Delaware Co., 6.91 miles: Jova & Kehoe, Newburgh, N. Y., $104,570.25.

Road No. 5246, Hancock-East Branch, Part 2, Delaware Co., 6.50 miles: Jova & Kehoe, Inc., Newburgh, N. Y., $94,830.35.

Road No. 5459, Roxbury-Grand Gorge, Delaware Co., 5.66 miles: Gruner & Hallenbeck, Harriman, N. Y., $66,978.

Road No. 5455, Davenport Center-Oneonta, Delaware and Otsego Counties, 7.89 miles: De Graff & Hogeboom, Kingston, N. Y., $77,435.24.

Road No. 5338-A, Windsor-Deposit, Delaware and Broome Counties, 4.18 miles: Meckes & Abrogast, Stroudsburg, Pa., $55,119.

Road No. 5460, Wassaic-Dover Plains-Pawling Town Line, Part 1, Dutchess County, 10.87 miles: Bridgeport Construction Co., Poughkeepsie, N. Y., $116,757.60.

Road No. 5317, East Aurora-Holland, Part 1, Erie County, 4.97 miles; F. J. Mumm Contracting Co., Buffalo, N. Y., $127,354.10.

Road No. 5453, East Aurora-Holland, Part 2, Erie County, 4.52 miles: H. P. Burgard Co., Buffalo, N. Y., $66,957.80.

Road No. 1090, Saranac Lake-Lake Clear Junction, Part 1, Franklin County, 4.35 miles: Beede Bros., Keene Valley, N. Y., $51,138.30.

Road No. 5468, Chateaugay-Clinton County Line, Franklin Co., 4.66 miles: Michael J. Fitzgerald, Chateaugay, N. Y., $73,162.25.

Road No. 5462, Cairo-Windham, Part 2, Greene County, 2.44 miles: Caesar A. Rossi, Torrington, Conn., $31,357.90.

Road No. 5466, Ilion-Cedarville, Herkimer County, 7.12 miles: Jova & Kehoe, Newburgh, N. Y., $75,881.70.

Road No. 1148, Cape Vincent-Watertown, Part 1, Jefferson County, 8.91 miles: Ruddy-Saunders Construction Co., Troy, N. Y., $67,266.

Road No. 5210-A, Middletown-Bloomingburg, Orange County, 0.48 mile: Jackson Bros., Cuddybackville, N. Y., $4,923.50.

Road No. 5448, Albion Village, West & East Aves., Orleans County, 1.84 miles: Ripton & Murphy, Rochester, N. Y., $54,-226.

Road No. 1168, Hermon-Russell, St. Lawrence County, 6.45 miles: Richard Hopkins, Troy, N. Y., $63,854.

Road No. 1126, Canton-Pierrepont, St. Lawrence County, 7.88 miles: Beede Bros., Keene Valley, N. Y., $66,210.65.

Road No. 5467, Massena Village, St. Lawrence County, 1.84 miles: Rhody & Clawson, Albion, N. Y., $94,244.50.

Road No. 5314, Scotia-High Mills, Schenectady County, 5.45 miles: Wm. G. Fox, Saratoga Springs, N. Y., $79,940.

Road No. 5458, Cobleskill-West Richmondville, Schoharie County, 8.94 miles: Lane Construction Corporation, Meriden, Conn., $93,272.25.

Road No. 5457, Bloomingburg-Monticello, Part 2, Sullivan County, 6.48 miles: Thos. H. Gill, Boston, Mass., $96,193.

Road No. 1167, Hastings-on-Hudson Village, Saw Mill River Road, Westchester County,, 1.28 miles: Alfred Price, Richfield Park, N. J., $29,514.

Road No. 5464, Goldens Bridge-Purdy-Croton Falls, Westchester County, 4.74 miles: Alfred Price, Richfield Park, N. J., $73,378.50.

Road No. 5324-A, Dundee-Penn Yan, Yates County, 2.47 miles: Lane Construction Corpn., Meriden, Conn., $13,605.60.

Road No. 5087, Geneva-Waterloo, Seneca County, 5.91 miles: Michael H. Ripton, Rochester, N. Y., $35,804.

The following proposal was for repair of highway by State aid:

Rep. Cont. No. 533, Road No. 523, Hamburg-North Collins, Erie County. 0.72 mile: Harry B. Harrison, East Rochester, N. Y., $15,455.71.

SEWERAGE

Huntington Beach, Cal.—Torrance, Marshall & Co. were successful bidders for $35,000 sewer bonds just issued by this city.

Pensacola, Fla.—In accordance with instructions from Board of Commissioners, City Engineer Thornton has submitted to Board estimates of cost of additional sewers in southwestern part of city, total cost of same being about $34,000.

Atlanta, Ga.—For purpose of considering installation of modern sewerage and water system, meeting of residents of Hapeville will be called. Survey of town with estimate of probable cost of work has already been made.

Fort Wayne, Ind.—Board of Public Works has adopted resolutions and ordered plans for sewers as follows: In alley between Piqua and Victoria Aves., in alley between Victoria and Calhoun and in alley between Calhoun and Harrison, all from Darrow to Rudisill Blvd.; in alley between French and Rudisill from Hoagland to alley east of Fairfield and in that alley from French to Branning; also in alley south of Rudisill Blvd. from alley east of Fairfield to Hoagland Ave.; also in alley between Arlington and South Wayne Aves. from Rudisill to Branning.

Keokuk, Ia.—A measure calling for issuance of sewer, grading and special improvement bonds, aggregating $50,000, will be sumbitted to voters of city at special election.

Pittsburgh, Kan.—Ordinance has been provided for construction of lateral in sewer lateral district No. 26, main sewer district No. 3.

Baltimore, Md.—Board of Awards has approved Sewerage Commission's recommendation for adoption of Imhoff tanks at sewerage disposal plant at Back River. Through these tanks sewerage for area inhabited by 112,000 persons will be disposed of and with their installation Sewerage Commission declares plant will be placed on most modern basis.

Willimansett, Mass.—Residents of Fairview are urging installation of sewage system.

St. Paul, Minn.—Plans for Maryland-Brainerd sewer system have been transmitted to Board of Public Works by city engineering department. Estimated cost of system is $30,600, of which city has appropriated $15,045 from main sewer fund.

Caruthersville, Mo.—Frank L. Wilcox, of St. Louis, is preparing plans for sewer system to cost $60,000.

Hannibal, Mo.—B. F. Smiley, City Engineer, will receive bids for constructing sewers in Dist. 300. Estimated cost, $30,-000.

Jersey City, N. J.—Installation of new sewers in 11th and 15th Sts. is under consideration.

Linden, N. J.—Election will be held on April 22 for voting bonds in sum of $23,600 for construction of joint outlet or trunk sewer. F. R. Anderson is township clerk.

Milleville, N. J.—See Miscellaneous.

Plainfield, N. J.—Continuation of storm sewer on Greenbrook Rd. from Duer St. to Somerset St.

Plainfield, N. J.—Councilman Leighton Calkins has introduced resolution which was adopted providing for bond issue of $300,000 to defray city's share of joint sewer project.

Princeton, N. J.—At adjourned meeting of Borough Council action was taken on public improvements during spring and summer. Work includes building of sewer extension in eastern part of borough and adjoining lands of Princeton Township, where 6,485 feet of new sewer line are to be laid. Part of eastern sewer extension on Murray Place and Prospect Ave. is entirely within borough, and comprises 2,045 feet. This improvement having already been approved, bids were opened for work and material. The McCarthy & Sons Co., lowest bidder, was awarded contract, its bid for bulk of work being $1,205. Bids were also opened for material for this extension, bidders being The Reardon Co. and the J. V. D. Beekman Co., the contract going to former as lowest bidder.

Brooklyn, N. Y.—Installation of sewer basins at Eleventh Ave. and 48th St. has been ordered.

Patchogue, L. I., N. Y.—Steps are being taken to improve sewer conditions of North Ocean avenue.

Watertown, N. Y.—Bids for sanitary sewer in Clinton avenue, between Bronson and Huntington streets, have been received and referred to city engineer to compute. Bidders were: Hodge & Foster, $4,674; Burns Brother & Haley, $4,398.50, and Gooby & Allard, $2,671.50.

Hudson, O.—Ordinance has been adopted for bond issue of $2,000 for purpose of constructing sewers for Village of Hudson. E. L. Fillins is Surveyor.

Seaside, Ore.—Construction of sewer system is contemplated. Engineer is C. W. Green, of Spokane.

West Hazleton, Pa.—Bids will be received by Wm. Krapf, Secy. Borough Council, until 7 p. m., May 1, for purchase of $50,000 bonds for completion of sewer system and paving of Broad St.

Tarentum, Pa.—Plans prepared by Consulting Engineer Hudson of Pittsburgh for sewerage disposal plant have been accepted by Boro Council.

Dallas, Tex.—City Secretary has been instructed to advertise for bids for sanitary sewers in Comal and Lewis Sts.

Dallas, Tex.—Bids have been invited for laying of 6-inch sanitary sewer on Highland and Turney, between Payne and Moody.

Houston, Tex.—Ordinance providing for issuance of $100,000 drainage sewer bonds was placed on its first reading at meeting of City Council.

Houston, Tex.—An agreement under which Houston Heights will be able to connect its proposed sewage plant with that of Houston is pending between officials of two cities. Houston Heights proposes to pay city $15,000 for interest in Willow St. disposal plant and to construct one mile of sewers in Houston city limits. Money would be used to enlarge Willow St. plant.

San Antonio, Tex.—An ordinance authorizing issuance of $100,000 drainage sewer bonds has been placed upon its second reading.

CONTRACTS AWARDED.

Los Angeles, Cal.—To James Kennedy, of Fargo, N. D., contract for construction of $600,000 storm sewer.

Stockton, Cal.—For construction of vitrified clay pipe sewers in various streets to F. C. McIntire.

East St. Louis, Ill.—Board of Local Improvement to Keely Brothers, of East St. Louis, for rebuilding Illinois street sewer, at $13,740.

Fort Wayne, Ind.—City will get 1,000 ft. of sewer cleaned for 15 cts. a ft., and if machine that does the work is purchased at cost of $1,500 the $150 for cleaning will be applied on purchase price, according to contract by Board of Works and President P. A. Fuchs, of Turbine Sewer Cleaning Machine Co., of Milwaukee.

Muncie, Ind.—By Board of Public Works, contract for construction of 1,336 lin. ft. of 12-inch vitrified pipe sewer in Hackley St., to William Birch, 800 E. Washington St.

Council Grove, Kan.—For constructing approximately 23,800 feet lateral sewers to Everett & Burt, of Hutchinson, at $16,000. Alva J. Smith is engineer, Emporia.

Independence, Kan.—For constructing storm sewer to Green & Cullen, of Independence, at $5,759. G. H. Krienhagen is city clerk.

Rowland, N. C.—See Lighting and Power.

Eugene, Ore.—By City Council, contract to rebuild sewer on 13th Ave. east, from Alder St. to Mill St., to Hall & Soleim, whose bid was over $700 lower than highest presented. There were four bids, as follows: Hall & Soleim, $1,587.74; C. H. Mahany, $2,307.20; Stein Bros., $1,898, and Soleim & Aageson, $1,932.03.

Columbus, O.—To J. F. Ryerson, at $29,161, for construction of Livingston Ave. storm sewer.

Erie, Pa.—Contracts for additional sewers and electric wire conduit in Peach St. have been awarded by Council. The 9-in. tile sanitary sewer in Wayne St., south 600 ft. from 26th st., was given to Mayer Bros.' Construction Co., at their bid of $579. Contractor Willis Bancroft, Jr., who bid $240.50 for the work, was given contract for building 9-in. sanitary sewer in 24th St., west from State St. 150 ft. Contract for 9-in. sanitary sewer in Plum St. south from 17th St. 175 ft., was awarded to Edward Driscoll at his bid of $218.75.

Dallas, Tex.—For laying 6-in. sanitary sewer on Hall St., from Ross to Knight, to C. W. Olcott at $1,562.70.

Houston, Tex.—To Horton & Horton, city, at $12,089, for construction of storm sewers, manholes, stubs and laterals on various streets.

Vancouver, B. C.—To Dominion Cement Pipe Co., at $35,352, for furnishing sewer pipe and for furnishing castings to Vancouver Eng. Co., at $8,250.

WATER SUPPLY

Troy, Ala.—City of Troy will soon begin to further its work on new water system, that of connecting artesian system to city mains. About $20,000 will be spent on its new pipe line, reservoir and pumping station. When new system is completed, Troy will have two water systems.

South Pasadena, Cal.—Citizens of South Pasadena in near future will have opportunity to vote again on question of municipal ownership of water.

Bristol, Conn.—Water Commissioners Charles L. Wooding and Daniel F. Crowley have asked for appropriation sufficient to enable water department to carry out instructions of Council to get water pipes and equipment on Main and North Main Sts. ready for permanent paving.

Hartford, Conn.—Bids of contractors on Phelps brook dam contract, portion of new Nepaug water supply, opened, showed bids ranging from $234,020, that of Pierson Engineering & Construction Co. of this city, to $365,655, bid of Beaver Engineering & Contracting Co. of New York. There were eleven bids and that of Pierson Co. was lowest. Pierson Engineering & Construction Co., Bristol, $234,020; T. Stuart & Son Co., Newton, Mass., $249,370; Leonardo Suzio & Frank Arrigoni & Bro., Middletown, $265,429; Jobson & Gifford Co., New York, $269,250; Daniel O'Connell's Sons, Holyoke, $278,640; Long & Little Co., Leominster, Mass., $284,451; C. W. Blakeslee & Sons, New Haven, $290,213; R. H. Newell Co., Uxbridge, Mass., $300,005; Ryan-Unmack Co., New Haven, $304,746; J. J. Prindiville Co., Framingham, Mass., $329,528; Beaver Engineering & Contracting Co., New York, $365,655. Board did not award the contract. It will do so later. Quotations on the separate items of contract by lowest bidder were as follows: Stream control, $4,300; care of travel, $2,200; earth excavation below el. 428, 3,000 cu. yds., $1.70; earth excavation, not inc. above, 23,000 cu yds., 70 cts.; rock excavation, 1,100 cu. yds., $3.50; rock excavation, not inc. above, 2,000 cu. yds., $3.50; special preparation of rock surfaces, 1,700 sq. yds., 35 cts.; refilling and embanking—soil, 45,000 cu. yds., 45 cts.; refilling and embanking—gravel, 195,000 cu. yds., 35 cts.; surface dressing and grassing, 7,500 cu. yds., 75 cts.; concrete masonry, class A, 7,600 cu. yds., $3.85; concrete masonry, class B, 800 cu. yds., $5.40; concrete masonry, class C, 500 cu. yds., $5.60; finishing concrete surfaces, 600 sq. ft., 10 cts.; granolithic finish or mortar facing, 1,400 sq. ft., 10 cts.; brick masonry, 20 cu. yds., $20; grouting machines and equipment, $500; making connections, 200, $1.50; grout, 300 cu. yds., $4; drilling holes in rock and masonry, 3,000 lin. ft., 50 cts.; Portland cement, 12,500 barrels, $1.65; paving and dry rubble masonry, 6,000 cu. yds., $2.75; riprap, 2,500 cu. yds., $2; cast-iron pipe and special castings, 150 tons, $48; small steel pipe, 3,000 pounds, 10 cts.; metal for reinforcing concrete, 110,000 pounds, 4 cts.; miscellaneous cast iron, wrought iron and steel, 30,000 pounds, 6 cts.; bronze and copper, 300 pounds, 50 cts.; handling metal work, 20,000 pounds, 2 cts.; vitrified pipe, 8 inches or less, 300 lin. ft., 40 cts.; vitrified pipe, 10 to 15 inches, 100 lin. ft., $1; gravel surface for highway, 2,000 sq. yds., 50 cts.; gravel and broken stone, 100 cu. yds., $1.75; test borings, 100 lin. ft., $5.

Wilmington, Del.—See Streets and Roads.

Phenix City, Ga.—Bond issue of $15,000 will be voted by people of Phenix City at an early date for purpose of improving waterworks plant in city. Erection of dam across creek in West Phenix City for storing of additional 15,000,000 gallons of water is being contemplated.

Galesburg, Ill.—Bond issue for better water supply is advocated.

La Porte, Ind.—City engineer has been authorized to prepare plans and specifications for water meters to be used in La Porte and clerk was authorized to advertise for bids. It is expected that 1,000 or more of meters will be installed.

Pittsburg, Kan.—Voters will shortly decide upon a $5,000 extension of water works bonds for construction of additional water works plant.

Salem, Mass.—City Directors are calling for bids on another loan of $15,500 for water pipe.

Saugus, Mass.—Citizens have voted for serial bond issue of $10,000 for improvement and extension of town's water system.

Deerwood, Minn.—Construction of water works and sewer system from plans of Oscar Claussen Eng. Co., of St. Paul, are being considered. Cost, about $25,000.

Chillicothe, Mo.—City council has passed an ordinance naming Saturday, April 4, as date for qualified voters of Chillicothe to cast their ballot on question of whether or not City of Chillicothe shall be bonded in sum of $100,000 to buy or build a water plant.

Albion, N. Y.—At village election proposition for municipal ownership of water works system was carried by vote of 222 to 18. It provides for $100,000 to buy present system and $65,000 for improvements. In August, 1912, village voted funds for municipal water works. Proposition now carried takes the place of the former one.

Brooklyn, N. Y.—Board of Estimate will approve contract plans and specifications for laying water mains in various sections of Brooklyn. These are streets in Bay Ridge section, where mains are to be laid at cost of $16,305.50; 4th, 47th, 51st, 57th, 64th, 66th, 68th, 69th, 75th, 76th, 77th and 83d Sts., and in 17th and Webster Aves. and Wakeman Pl. System is also to be extended into Coney Island section of borough, to furnish water along streets where building operations are under way. These thoroughfares are: Mermaid Ave., West 24th and West 30th Sts. Cost is estimated at $4,400.

Buffalo, N. Y.—Bids have been received in offices of department of public works for proposed water purifying plant to be installed here. Bids are for treatment of water by chlorine gas or by hypochlorite of lime. Lowest bidder was Wallace & Tiernon Company of New York at $3,300. The Electro-Bleaching Gas Company of New York bid $3,325. One bid was $8,000.

Ballston Spa, N. Y.—Board has voted to purchase 900 ft. of 4-in. water pipe for Charlton St.

Pittsford, N. Y.—Citizens have voted to appropriate $6,000 for reservoir.

Cincinnati, O.—Council has passed ordinance for issue of $604,000 bonds for laying 36-in. water mains. It is said that Bd. of Pub. Service will spend $20,000 for cleaning water mains of city during 1914.

Cleveland, O.—Water Engineer Ezra B. Whitman, of Baltimore, Md., has been appointed consulting engineer on large filtration plant for which city is now preparing specifications.

Hudson, O.—Ordinance has been adopted for bond issue of $6,000 for extending and enlarging waterworks system. B. S. Sanford is clerk.

Salem, Ore.—An application for permission to appropriate waters of Adams Creek for municipal purposes has been filed with State Engineer Lewis by J. Frank Stroud, of Beaverton. Plan, according to application, is to furnish town of Yoncalla, in Douglas County, with water and to generate power. To supply town it will be necessary to construct pipe line 4½ miles in length.

Allentown, Pa.—Ordinance has been passed for purchasing of Bethlehem City Water Co.'s holdings in 14th Ward for $19,500.

Erie, Pa.—Ten thousand dollars which city will soon receive from water works department may be used in buying motor driven aerial truck for fire department.

West York, Pa.—Plans for ordinance regulating measuring of water supplied by York Water Company to consumers in Borough of West York and requiring installation of meters under certain conditions have been discussed at special meeting of West York council.

Warwick, R. I.—A municipal water plant has been strongly recommended.

Salt Lake City, Utah.—Petitions for extension of water mains are being considered.

Norfolk, Va.—Finance Com. of Council has passed resolution to expend $75,000 for extension of water meter system.

Norfolk, Va.—Resolution is being considered appropriating $4,939 for water mains and connections in Twenty-sixth and Thirty-ninth streets and Bowden's ferry road.

Centralia, Wash.—City Commission has accepted plans and specifications of City Engineer Stanley Macomber for construction of new reservoir of Centralia's municipal gravity water system and city clerk has been instructed to call for bids. Bids will be opened on March 31 and active construction will begin immediately thereafter. Engineer's estimate of the cost is $25,000. New reservoir will have capacity of 3,000,000 gallons.

CONTRACTS AWARDED.

Hartford, Conn.—Contract for building of Phelps brook dam has been awarded to Pierson Engineering and Construction Company, of Bristol, by water board.

Moline, Ill.—To Pittsburgh Meter Co., Pittsburgh, Pa.; Union Meter Co., Worcester, Mass.; Hersey Meter Co., of Chicago, and Thomson Meter Co., of Brooklyn, N. Y., contracts to furnish 1,400 water meters at estimated cost of $11,000.

Chelsea, Ia.—For water works for city of Chelsea to Katz Constr. Co., Omaha, Neb., at $14,802.37.

Mitchellville, Ia.—For constructing municipal waterworks to Des Moines Bridge and Iron Company, of Des Moines, at $14,960. Other bidders: Bash & Gray, St. Joseph, Mo., $15,185; Rock Island Bridge and Iron Company, Rock Island, Ill., $15,673; Public Service Company, Omaha, Neb., $16,253; Katz Construction Company, Omaha, Neb., $16,732; W. L. Lovell Company, Minneapolis, Minn., $16,636.

Atchison, Kan.—To National Water Main Cleaning Co., 61 Park Row, New York City, for water main cleaning.

Esbon, Kan.—To E. T. Brooks & Sons Co., Jackson, Mich., at $23,721, for installation of waterworks and electric light plan.

Perth Amboy, N. J.—By Board of Water Commissioners contract for furnishing pump and condensing turbine to Worthington Pump Co., of Paterson at $2,450.

Buffalo, N. Y.—By Bd. of Pub. Wks. to Hiram K. Rankin, 66 Tillinghast Pl., for constructing reservoir at J. N. Adams Memorial Hospital at $4,896.

Rochester, N. Y.—By Bd. of Contract and Supply for furnishing and laying pipe for new conduit to extend for eight miles from Hemlock Lake to city and connect with present conduits: R. T. Ford Co., Rochester, hauling and laying steel pipe at $138,327; U. S. Cast Iron Pipe & Fdry. Co., for 8,870 tons pipe for Hemlock conduit, $199,880, and for stop valves on conduit line to Rensselaer Water Works Co., of Troy, at $6,140. To Camden Iron Works Co., of Philadelphia, for furnishing pipe for distributing system at $138,414.

Rowland, N. C.—See Lighting and Power.

Aransas Pass, Tex.—To Oneil Engineering Company, of Dallas, for installing waterworks and electric light plant.

Somerville, Tex.—For boring well for new water system to A. A. Snell, of Houston. Bid was for 12-in. well, with casing and strainer complete, at $5.00 per foot.

Salt Lake City, Utah.—Bid of Mullins & Palmer of $9,288 was lowest bid opened by city commission on work of covering North Temple aqueduct from First to Third West streets. Contract probably will be awarded to this firm. Engineer's estimate of cost was $10,000. J. B. Mullins, of above firm, was low bidder on contract to cover city canal from Belmont to Princeton streets. His bid was $7,880.95, while engineer's estimate was $9,300.